

**PERFORMANCE OF PUBLIC SECTOR
INFORMATION SYSTEMS PROJECTS:
THE CASE OF UK CENTRAL GOVERNMENT**

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LIST OF ABBREVIATIONS

APM: Association for Project Management

APMBoK: Association for Project Management Body of Knowledge

CAQDAS: Computer Assisted Qualitative Data Analysis

ICT: Information and Communications Technology

IS: Information Systems

IT: Information Technology

MIS: Management Information Systems

MoP: Management of Projects

NAO: National Audit Office

NHS: National Health Service

NPfIT: National Programme for Information Technology

OGC: Office of Government Commerce

PM: Project Management

PMBok: Project Management Body of Knowledge

PMI: Project Management Institute

PMO: Project Management Office

PRINCE2: Projects IN Controlled Environments

PS: Public Sector

VfM: Value-for-Money

ABSTRACT

Despite the continuous need to enhance the value of public services, information systems projects in the public sector still underperform due to their high velocity of change and strategic ambiguity. Diverse studies have been carried out examining 'project capabilities' to contribute to the efficiency of information systems project management. However, most studies of project capabilities focus heavily on the project execution that aims for successful implementation of systems. This supplier-oriented approach leads to overlooking the significance of a project owner's benefits realisation after implementing the information systems. Moreover, this formulation of project capabilities also does not distinguish between dynamic capabilities for benefits realisation and operational capabilities for project execution. For these reasons, the realisation of a project owner's information systems benefits has still been far from satisfactory, in addition to having a poor rate of project success. In order to address this issue, this thesis develops a more nuanced perspective on project capabilities by distinguishing the dynamic capabilities of owners from the operational capabilities of suppliers and by developing the concept of owner dynamic capabilities. This is followed by analysis of the importance of benefits management as an owner dynamic capability.

The aim of this study is to contribute to a deeper understanding of why public sector information systems projects are so challenging and how the project owner's information systems benefits can be accelerated. A content analysis method was adopted, and 10 years of National Audit Office Value-for-Money reports were analysed covering 31 information systems projects. Theoretically the concept of 'owner dynamic capabilities' is introduced, and the experience of UK central government information systems projects is empirically reviewed. The results bring a key implication by showing the significance of benefits management as a distinctive 'project back-end' owner dynamic capability.

This thesis makes three main contributions to the current literature in information systems project and benefits management. First, the concept of owner dynamic capability is introduced and theorised based on a unique data set of major public sector information systems projects. Second, the importance of project back-end capability is revealed as a distinctive dynamic capability, which owners require to move their information systems investment from practical completion (the system works as expected) to beneficial use (the system delivers the expected business benefits). Third, the key findings provide the future research agenda for project management disciplines.

DECLARATION

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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“About the year 1680 began the art and mystery of projecting to creep into the world.”

- Daniel Defoe, *Essay upon Projects*, 1697 -

CHAPTER 1. INTRODUCTION

1.1 Chapter Overview

This chapter will provide the research background, objectives of the study and methodological approach. The introduction is composed of three main sections: research context, research approach and structure of thesis. The research context section covers the research background, objectives, necessities and research framework. The research approach section explains the research process, including the contextual details of the literature review. The structure of thesis section describes the content of each chapter in this thesis.

The first section introduces the general context of the research. The theoretical foundation that motivates this study will be explained. By examining current underperforming public sector information systems (IS) projects and their managerial difficulties, the study will emphasise the necessity of studying a project owner's capabilities and the importance of benefits management. On the basis of the research background, the objectives and necessities of the research will be clarified. In addition, a framework and its description will also be provided to summarise the context of the study. Thus, this section highlights the 'what' and 'why' of the research.

The second section, describing the research approach, outlines 'how' this research will be carried out. The overall procedure of this study will be introduced. From initiating the study to completing it, the data collection and analysis will be explained. In particular, the process used in the literature review will be highlighted to justify the study's systematic and structural approach. For instance, understanding the literature review map and the theoretical structure of the review helps in understanding how the initial research was conducted.

The last section of this chapter provides the structure of the thesis. This thesis is composed of eight chapters: introduction, literature review (chapters 2 to 4), research methodology, results and findings, discussion and concluding remarks. This section summarises what each chapter contains and how each is organised. Before moving onto the next literature review chapter, a summary of the introduction will be provided.

1.2 Research Context

1.2.1 Background

Managing projects and project performance have become a growth area in both public and private organisations. In particular, public project investment has constantly increased to enhance the efficiency of operating and delivering public services. In the case of the UK central government, this project trend can easily be observed. According to recent UK government reports, for instance, 188 major projects have been carried out that include £489 billion investment as of 2014 (Major Projects Authority, 2014, 2015). The estimated budget was more than £20 billion, and the entire life cost was approximately £500 billion. One significant point is that this is not a short-term portfolio but a long-term masterplan for decades. Amongst the on-going projects, one fifth of the projects is planned to be completed by 2020-2030.

Amongst the projects, IS project success/failure and performance management has become a dominant issue across most organisations (Morris and Hough, 1987; Doherty *et al.*, 1998; Crawford *et al.*, 2006; Gauld, 2007; Doherty *et al.*, 2012). Due to the continual emergence of new technologies, the frequency of implementing IS projects has increased to adopt new systems and improve operational performance (Chen *et al.*, 2009). For example, the UK government had around £6.9 billion of information and communications technology (ICT) spending in 2011-2012. As a result of the IS investment and strategies, £354 million was reported as savings by the Cabinet Office (NAO, 2013c). Within the perspective of citizen end users, 83% are online populations who use the UK IS public services. More than 80% of the top three public services were utilised by online transaction: applying for a student loan, booking a practical driving test and searching for a job through a government service (NAO, 2013a). As above, the impact of the IS projects and public services has created increasingly high demand in areas such as health systems, transport infrastructure, military equipment, tax payment systems and energy generation facilities. In order to cope with the business change and improvement triggered by IS, project capability is regarded as critical to facilitate and manage the systems more efficiently (Brady and Davies, 2004; Zwikael *et al.*, 2005; Melkonian and Picq, 2011; Davies and Brady, 2016).

Despite recognition of the importance of IS project capability, IS projects have still underperformed due to their complexity and strategic ambiguity in both private and public organisations (Ravishankar, 2013; Sandeep and Ravishankar, 2014). Though not all IS projects are software projects, the challenge and difficulties of IS projects can be representatively explained by those of software projects (Morris, 2013). The Standish Group is a research advisory organization that focusses on software project management and performance, and it publishes the annual Chaos Report to analyse optimisation for software project portfolios in the US (Standish Group, no date). In the report, the success criteria of software projects are defined as ‘on time and on budget with satisfactory results’, and software projects are categorised by three types of outcomes based on the criteria: successful, challenged and failed. According to previous and recently published Chaos Reports, the success rate of software projects is only around 28% during the twenty-year period from 1994 to 2015; the rate of challenged projects is around 48%, and 23% of them are considered failed during the same period (Standish Group, 2015).

In the UK public sector, there has been no big difference to the US project cases in terms of poor project performance. Representatively, the National Programme for Information Technology (NPfIT), the notorious IS programme in the National Health Service (NHS), wasted more than £20 billion (King and Crewe, 2013), and an abandoned patient record system has cost taxpayers nearly £10 billion as of 2013 (Syal, 2013). King and Crewe (2013) criticise the gross failures and low performance of IS in the UK central government in their book, *The blunders of our governments*. By providing examples of IS failures, the authors point out the wasteful expenditure and impractical use of IS. In the case of the IS project of the Home Office in 1998, for example, “after running more than a year late and missing three deadlines, the whole programme was abandoned at a cost to the exchequer - that is, taxpayers - of at least £77 million” (King and Crewe, 2013, p. 188). As another example, the lifetime cost of the national offender management systems project increased from £234 to £690 million after completing only 15% of the scheduled progress. Another project, the challenged FiReControl project, spent more than £469 million, nearly four times the primary estimate.

The disastrous performance of IS project management is triggered by several barriers. First, the complexity and ambiguity of IS intensifies the managerial confusion in

managing IS projects (Davies and Hobday, 2005; Wirick, 2011; El-Haddadeh *et al.*, 2013). Technological uncertainties aggravate the difficulties of IS project management. For this reason, acquiring and facilitating suitable project capabilities has become more arduous for IS project practitioners. Second, the unique characteristics of the public sector business environment also aggravate the poor performance in managing IS projects. For example, compared to IS projects in the private sector, public IS projects tend to focus on the value of public service rather than profit maximisation (Collins, 2005; Grimsley and Meehan, 2007; Piening, 2013). Public IS projects tend to be related to government funding and policies that lead to their changeability (Boyne, 2002; Piening, 2013). Public IS projects tend to be less capable of accessing external resources than private sector IS projects due to a lack of technological knowledge and experience (Pablo *et al.*, 2007).

Various studies have been carried out to address the poor performance in managing IS projects and to overcome the limitations of previously well-known project capabilities (Cicmil *et al.*, 2006; Kolltveit *et al.*, 2007; Kurbel, 2008). Above all, scholars have heavily focussed on the execution performance of IS projects (Morris and Hough, 1987; Morris, 2013; PMI, 2013; Pinto and Winch, 2016). In order to improve the IS execution performance, diverse project management topics have been studied, including capabilities, methodologies, strategies and processes. In this regard, one important point that requires attention is that IS project performance has a direct influence on a project owner's operational performance after IS implementation. In other words, a project owner's performance does not concern only the successful delivery of IS but also the realisation of project benefits during IS operation. The discontinuity between project success and benefits realisation is still at the heart of the conundrum we face (Ward *et al.*, 1996; Pan *et al.*, 2006; Ashurst *et al.*, 2008; Eveleens and Verhoef, 2010; Doherty *et al.*, 2012; Petter *et al.*, 2012; Sandeep and Ravishankar, 2014; Standish Group, 2015).

With respect to project capability, there have been two significant issues. The first is that most studies on project capabilities focus only on the project supplier viewpoint (Hislop, 2002; Flowers, 2007; Winch, 2014). The IS owner's project capabilities have received relatively little attention (Winch and Leiringer, 2016). The business aim of suppliers is to make the project a success (e.g. on time, on quality and on budget). Having suitable project capabilities enables a project supplier to implement

successful IS. However, this does not guarantee a project owner's satisfactory operation (Brusoni *et al.*, 2001; Bryde and Robinson, 2005; Flowers, 2007). The successful delivery of a system as specified is, needless to say, also an important goal for the project owner (Wateridge, 1998; Thomas and Fernández, 2008; Chen *et al.*, 2009; Flyvbjerg and Budzier, 2011), but this does not mean that operational business benefits are realised (Ashurst *et al.*, 2008; Melton *et al.*, 2011). Thus, a successful project is not a sufficient condition but only a necessary condition for the business success of the IS investment; nevertheless, it is still the business benefits that are at the core of the business case which justifies the IS investment in the first place. A project owner's major consideration involves how to realise benefits from IS in its business operation rather than the IS execution itself. On the basis of this context, this thesis uses the term 'owner' rather than 'client' to denote this larger business responsibility rather than focussing on the commercial and contractual relationship for project delivery with the supplier, which the word 'client' implies (Winch, 2014). In this research, 'project owner' is used as a key term instead of 'project client'. The concept of a project owner emphasises the accountabilities and ownerships of a project client to realise and to manage IS project benefits.

In addition, the second issue is that no distinction has been made between dynamic and operational capabilities in terms of project capabilities (Winch and Leiringer, 2016). An IS project is a continually occurring event, which means that IS changes constantly. In order to deal with this change, dynamic capabilities to reconfigure existing capabilities are essential. In other words, operational capabilities are a key aspect to a project supplier in managing IS project operation. To a project owner, however, newly created or modified capabilities are essential to realise benefits from the newly implemented IS. On the basis of this context, this thesis follows a more nuanced perspective on project capabilities by distinguishing the dynamic capabilities of owners from the operational capabilities of suppliers (Winch, 2014). With regard to the concept of project capability, a project supplier needs operational capabilities, and a project owner needs dynamic capabilities.

1.2.2 Objectives and Necessity

The aim of this thesis is to examine a project owner's dynamic capabilities to realise IS benefits within the context of public IS projects. By empirically investigating a project owner's project concerns in the UK public sector, the objective of the study will be addressed. This research objective starts with the fundamental but still unanswered questions: why are public IS projects so challenging, and why is it so difficult whether the organisation will realise benefits after the successful delivery of a project? To resolve these issues, the concept of dynamic capability will be utilised as a theoretical lens to analyse which dynamic capabilities are required for a public IS project owner to realise benefits.

The initial research questions will be developed again after reviewing relevant literature to set up more detailed final research questions. The finally defined research questions are provided in the following section: 4.5 Summary of Literature Review and Research Questions. The initial questions are as follows:

- What are the common managerial issues in public information systems projects?
- What is owner dynamic capability (a project owner's dynamic capabilities)?

To examine the research objective and the initial research questions, a few sub-objectives need to be addressed. The first sub-objective is to understand IS project difficulties and concerns in the public sector. These topics have been studied frequently in project management disciplines. However, they are still a challenge. In particular, supplier-focussed studies have been dominated by project management and capability studies. To achieve a better understanding of differentiated managerial issues between a supplier and an owner organisation, UK empirical data will be analysed.

The second sub-objective is to analyse required project capabilities from the perspective of a project owner. Based on the interim findings from the first sub-objective, major project issues and difficulties will be identified. Moreover, these issues will be examined through the theoretical lens of dynamic capability to determine a project owner's dynamic capabilities and which dynamic capabilities are necessary.

Using this stepwise approach, the final aim of the study can be achieved: determine owner dynamic capabilities needed to realise IS benefits within the context of public IS projects.

1.2.3 Problem Framework

Figure 1-1 explains the context of the thesis, including the research background and relevant problematic phenomena in a project management environment. The figure helps visualise a project owner's capability gaps between the stages of IS implementation and operation. Each component will be explained in the following paragraphs.

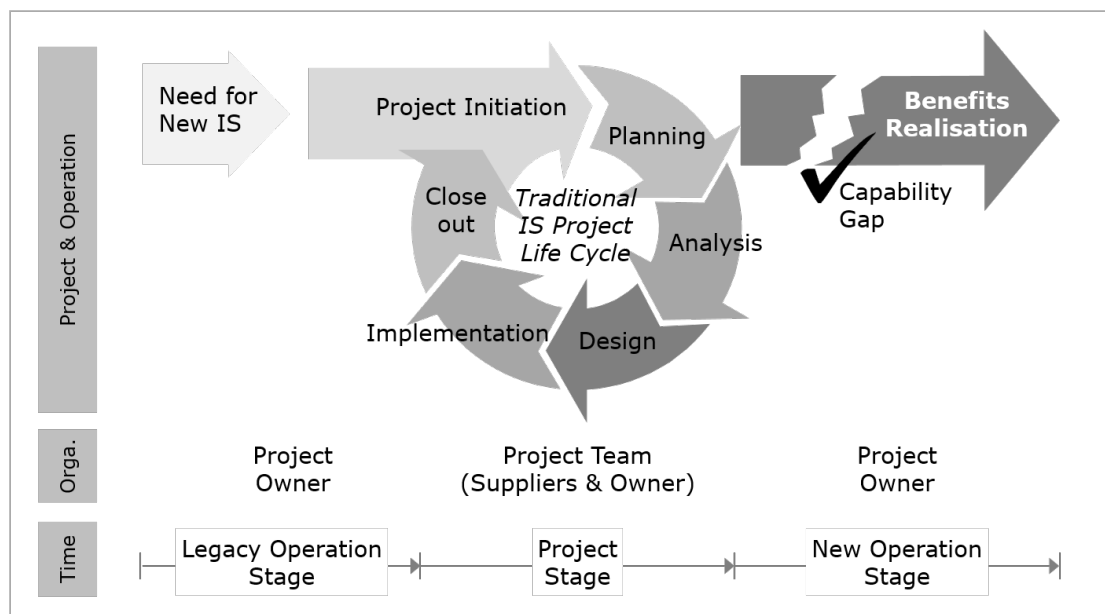


Figure 1-1: Problem framework

Vertically, there are three stages in the diagram (legacy IS operation stage, IS project stage and new IS operation stage). The first row describes the project and operation stages and their procedural flow. The second row indicates the ownership of each stage. The third row names each stage of the framework.

Due to a need to improve the legacy IS of a project owner, an IS project is initiated and launched. During the project life cycle, the temporary project organisation (a combination of project supplier and owner organisation) manages the IS

development and relevant IS transition. However, after completing the IS project when a project supplier is disbanded, an owner's organisation must manage its new systems and facilitate operational IS benefits independently without the engagement of the supplier. In this situation, compared to the legacy IS management capability, the owner's reconfigured capabilities are essential to deal with the new IS and to realise benefits from the IS. In other words, a project owner's dynamic capability (owner dynamic capability) is the critical factor to create improved operational capabilities to realise IS benefits.

As seen in Figure 1-1, classic project management studies have identified the fixed project life cycle from initiation to close out. In this context, the previous project capability studies have focussed heavily on the capabilities 'during' the life cycle without consideration of post-implementation benefits after project completion. To minimise the capability gap between the legacy IS stage and the new IS stage, the concept of owner dynamic capability must be studied.

1.3 Research Approach

1.3.1 Research Process

Figure 1-2 describes the entire research process for this study. Before collecting research data, understanding the context of the research, defining the initial research questions and reviewing the relevant literature should be carried out to clarify which data are required and how the data can be analysed and interpreted. By applying this structural approach, the logical continuity of the research procedure can be secured. The major activities in each stage will be explained in the following paragraphs.

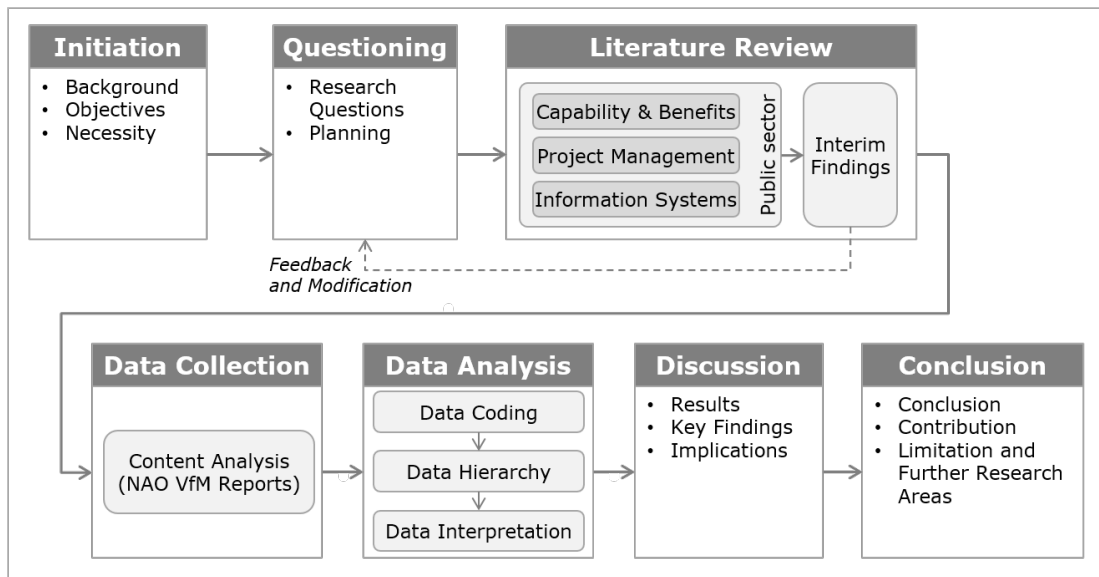


Figure 1-2: Research process

The initiation stage is the first step to identify research objectives. By understanding the research background, the aim of the research and its necessity can be clarified. In the context of this thesis, the current problematic phenomena in project management disciplines and practices are understood in this stage. Then, the research objective is identified.

The second stage is to set up the initial research questions and plan the research process/methodology. In advance of carrying out the literature review, clarifying what and how to research is important to ensure high-quality research. The initial questions and the research methodology are planned to achieve the objective of the study.

Reviewing relevant literature is the third stage to secure interim findings. The interim findings support the revision and clarification of the final research questions as input feedback to the questioning stage. The details of the literature review are explained in the following section, 1.3.2 Approach and Structure of Literature Review.

The next stage is data collection. In this thesis, the National Audit Office (NAO) Value-for-Money report is the original source of data. In advance of collecting the research data, report selection criteria need to be established.

Data collection is followed by the data analysis stage. Based on the collected NAO reports, coding the data, developing the data hierarchy and interpreting the hierarchical data are carried out.

The sixth stage involves discussing the key findings and implications. Several topics are discussed in this stage to create a better understanding of the results and to emphasise the critical implications.

As the last stage, conclusions are offered.

1.3.2 Approach and Structure of Literature Review

The literature review is provided in three parts in chapters 2 through 4. To find the relevant literature, two main approaches were used: on-line scientific database search engines and manually searching a set of top-tier IS journals. First, most of the literature was found by exploring the major on-line full-text scientific databases, such as Science Direct, ProQuest and Web of Science. By applying a keyword search technique, most of the relevant papers were found. The keywords included project capability, dynamic capability, benefits realisation, IS projects and public IS management. In addition, backward searching was also carried out from the list of references in a few key papers.

Second, top-tier peer-reviewed IS journals, including eight from the senior scholars' Basket of IS Journals by the Association for Information Systems (AIS; 2011), were investigated to review the latest papers (published from 2010 through 2015). The Basket of IS Journals was first created by the College of Senior Scholars; this group consists of senior IS academics and has been organised by AIS since April 2007. The recent version of the Basket of IS Journals was revised in December 2011. The journal list is limited to those in the research field of IS and has been regarded as a widely respected and influential set of eight IS journals (AIS, 2011). In addition to those from the Basket of IS Journals, three influential journals were also included in the final scope of the literature search and review: *Information and Management*, *Information and Organization* and *Journal of Information Systems*. As a result, the explored top 11 IS journals are the *European Journal of Information Systems* (EJIS), *Information and Management* (I&M), *Information and Organization* (I&O),

Information Systems Journal (ISJ), Information Systems Research (ISR), Journal of Information Systems (JIS), Journal of Information Technology (JIT), Journal of Management Information Systems (JMIS), Journal of Strategic Information Systems (JSIS), Journal of the Association for Information Systems (JAIS) and Management Information Systems Quarterly (MISQ).

Furthermore, leading academic journals that cover project management and public management disciplines were also included in the search of previous relevant literature, such as the *International Journal of Project Management (IJPM), Project Management Journal (PMJ), Government Information Quarterly (GIQ), Public Administration Review (PAR) and Public Management Review (PMR).*

In advance of the review, a prerequisite task was completed to increase the efficiency of the review. After skimming and scanning the selected papers in those journals, the level of contextual relevance to this research was estimated by determining the rank of A, B or C (A: most relevant, B: relevant, C: less relevant). Then the literature review was carried out on the basis of the review framework, as seen in Figure 1-3.

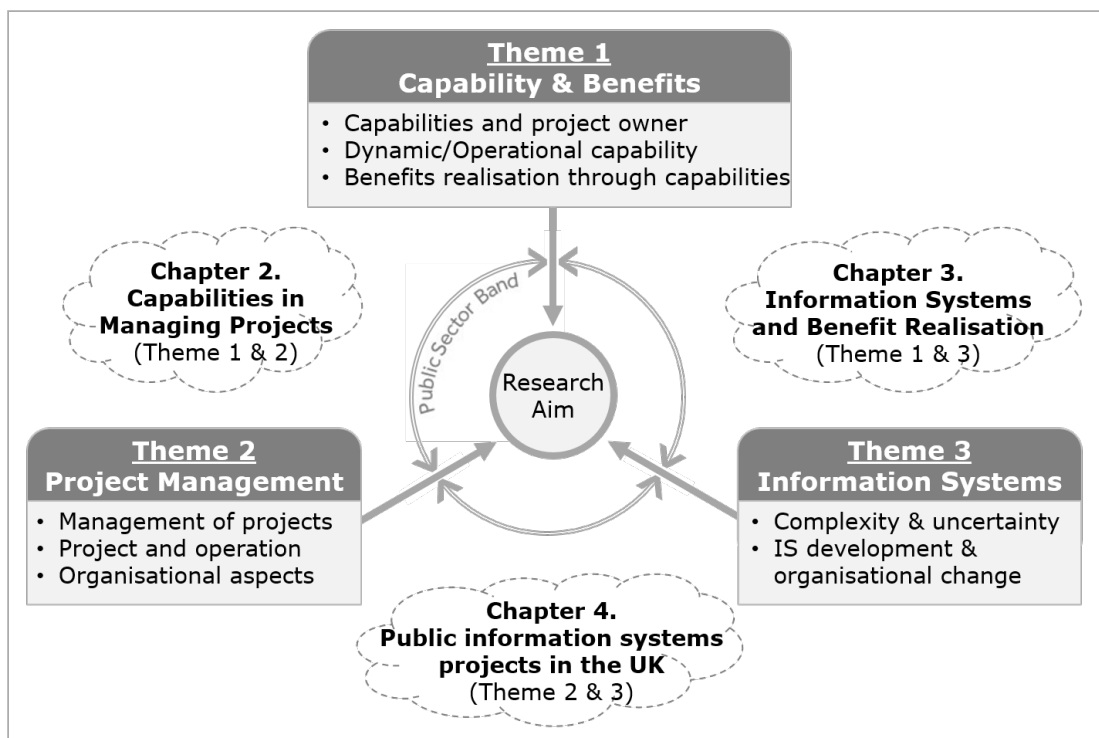


Figure 1-3: Literature review map

Figure 1-3 describes the theoretical structure of the literature review. Due to the characteristics of social science studies, this framework draws from the pragmatic question that arises from a social phenomenon: why are public sector IS projects so challenging when it comes to realising benefits? The framework helps approach possible theoretical solutions for the practical question.

The project-based implementation of IS is a well-known and well-established approach in most organisations (Pellegrinelli, 1997; Pan *et al.*, 2006). However, the project owner's realisation of benefits after the implementation is still far from certain even with successful delivery of the project (Ashurst *et al.*, 2008; Doherty *et al.*, 2012; Petter *et al.*, 2012; Zwikael, 2016). Even before project close out, the management of IS projects in the public sector has underperformed due to the projects' complexity and the lack of managerial capacity (El-Haddadeh *et al.*, 2013; King and Crewe, 2013; Wilkin *et al.*, 2013; Sandeep and Ravishankar, 2014). Thus, this thesis takes a project owner's perspective and argues that a project owner's dynamic capabilities can facilitate operational benefits after the delivery of IS projects (Winch and Leiringer, 2016). In addition, IS benefits delivery needs a certain amount of time to become operationally stabilised; this does not happen immediately when the IS starts running (system go-live) (Pellegrinelli, 1997; NAO, 2008e).

To address this issue, three initial themes can be instinctively revealed based on the context of this research: capability and benefits (theme 1), project management (theme 2) and information systems (theme 3). On the basis of the combination of three themes, another three overlapping research areas exist: 'capabilities in managing projects', 'information systems and benefits realisation' and 'public information systems projects in the UK'. Within the context of the public sector, the following three chapters (2, 3 and 4, respectively) will address the three research areas.

The first research area of the literature review covers the research topic regarding capabilities in a project management environment. This will be examined by reviewing the conceptual definitions of capability, organisational capability and dynamic capability, as well as their application in the context of project management. In this thesis, a project owner's dynamic capabilities are considered as triggers for

realising benefits from IS. Thus, it is essential to examine the context of a project owner, dynamic capabilities and the relationship between project capabilities and dynamic capabilities.

The second review area aims to identify the context of IS and related benefits. In the context of IS uncertainty and changeability, studies on how IS affects the management of benefits realisation will be reviewed. To do so, the IS project life cycle models and the organisational issues of IS will be reviewed, highlighting their limitations in terms of benefits management in project management disciplines. After that, the importance of benefits management and its impact on operational management in the public sector will be discussed.

The third research area relates to IS projects in the public sector, especially focussing on the UK government. First, the key characteristics of public sector businesses and their IS project management will be reviewed. Then, the trends and current initiatives related to IS projects in the UK central government will be outlined.

Every literature review chapter will provide descriptive information on previous studies, critiques and identified research gaps to justify the objectives of this thesis. By analysing these interrelated issues, a project owner's dynamic capabilities for realising benefits from IS projects will be examined to make an original contribution with this study.

1.4 Structure of Thesis

This thesis is composed of eight chapters, including this introduction. In classic thesis style, this thesis contains the introduction, literature review, methodology, results/findings, discussion and conclusion. After the introductory sections (chapter 1), chapters 2, 3 and 4 provide full explanations of the reviewed literature and critiques of the articles. This is followed by the methodological explanations and justifications (chapter 5). Chapter 6 provides the results and key findings from the collected/analysed data; the key findings and implications are discussed further in chapter 7. As the final chapter, conclusions are summarised in chapter 8. To help readers understand the whole thesis in a logical way, an overview and summary of each chapter are also provided.

Chapter 1 introduces the overall context of the thesis, including background, objectives and research framework. The structure of this chapter is as follows. In the first section, the research background is provided, including the key features of public IS projects, the poor performance of public IS projects and their benefits realisation, the lopsided studies on a project supplier's capability and a nuanced approach to the dynamic capabilities of a project owner's capability. After that, research objectives and necessities are highlighted with sub-objectives and initial research questions. Then, the research framework is introduced by describing the visualised problem framework. In the second section, the research approach is explained, including the overall research process and the structure of the literature review. In the third section, a synopsis of each chapter is provided.

Chapter 2, *Capabilities in Managing Projects*, mainly focusses on the concept of capability within the perspective of project management. By investigating these topics, the contextual gap between project supplier/owner capabilities is understood. Moreover, the importance of the project owner's capabilities is emphasised. The structure of this chapter is as follows. In the first section, the definitions and theoretical origins of core concepts are discussed, such as capability and project. For example, the various specific concepts of capability are defined, including capability, capability and competency, organisational capability and dynamic/operational capability. Then, the concept of project, programme and their management is clarified by discussing Morris' (2013) approach to the management of projects and theoretical debates on the difference between managing projects and programmes. In the second section, project capability is discussed by reviewing relevant literature and emphasising the necessity of an owner perspective.

Chapter 3, *Information Systems and Benefits Realisation*, covers IS project management, IS change and benefits realisation management. This part is also the key area to justify the necessity for and contribution of the study. By carrying out this literature review, the gap between IS projects and benefits realisation can be studied. In addition, the significance of owner dynamic capabilities - to facilitate operational benefits - can be emphasised. The structure of this chapter is as follows. In the first section, the key features of IS projects and the limitations of the current approach to the project management life cycle are reviewed. This is followed by explanations of the complexity and uncertainty of projects and information systems:

difficulties in managing IS projects and IS organisations. In the second section, the relationship between IS change and benefits realisation management is discussed by reviewing the definitions of benefits/values and benefits management, the benefits management process and life cycle and the issues in delivering benefits from information systems projects.

Chapter 4, Public Information Systems Projects in the UK, covers the key features of public sector business and IS implementation/management. Then, the need for a differentiated approach to managing public information systems projects - compared to the private sector - is suggested. Last, the initiatives and managerial status of IS projects in the UK public sector (data collection range) are outlined. The structure of this chapter is as follows. In the first section, the characteristics of public sector business and the necessity for differentiated management capabilities between the public and private sectors are reviewed. After that, differences in IS between the public and private sectors and relevant managerial difficulties in public IS are discussed. In the second section, detailed information about IS delivery in the UK public sector is provided. For example, major projects/portfolios and IS project initiatives in the UK government are introduced along with review critiques on the common project methodology, the PRINCE2 model. In response to the literature review, finally, the research questions are revised.

The applied methodology and the source of data are explained in chapter 5, Research Methodology. Methodologies in IS research are outlined, and the rationales for selecting a content analysis method are given. Then, the research design, including the data collection process, data coding procedure and analysis approach, is introduced. The information and full details of selected IS projects in the UK public sector are also described. The structure of this chapter is as follows. In the first section, the methodological approach and the trends of IS research are reviewed. In addition, the importance and advantage of using computer assisted qualitative data analysis (CAQDAS) is explained. In the second section, a content analysis method and its qualitative approach are introduced by summarising the history of content analysis and its methodological features. After that, differences between quantitative and qualitative content analysis and differences between inductive and deductive data coding are discussed. In the third section, the entire research design, including data collection and analysis, is explained in detail. For instance, the purpose of the

NAO report, the collected NAO data set, the procedure of data coding and hierarchy development and the stepwise approach of Nvivo utilisation are explained. In the last section of this chapter, the key project information of 31 selected cases (description of the selected 31 UK IS project cases) is summarised.

Chapter 6, Results and Findings, includes the data hierarchy, coding results by three main nodes and key findings. The key findings suggest the need for wider managerial coverage of a project owner's capabilities and the overall findings can be explained by categorising three types of project capabilities: project back-end capabilities, project front-end capabilities and project governance capabilities. In this thesis, 'results' refers to the quantified results of content analysis and 'findings' to the key findings on the basis of the quantified results and their further qualitative analysis. The structure of this chapter is as follows. In the first section, data coding results are summarised by categorising the results by each report and by providing the final hierarchical data model (three-tiered data hierarchy result). Then, the results are explained in detail by three main nodes: Project Management node, Information Systems node and Public Sector node. In the second section, key findings are emphasised: project back-end capabilities, project front-end capabilities and project governance capabilities.

Chapter 7, Discussion, considers key implications derived from the analysis results. In advance of further discussion, the three research questions are answered clearly by revisiting and summarising the results and key findings. After that, four topics are discussed: (1) paradoxical value of project commercial/contract capabilities and (2) project back-end capabilities, (3) a multidisciplinary approach to project and benefits management and (4) enhancing the management of project disciplines. The structure of this chapter is as follows. In the first section, the research questions and answers are discussed again to clarify the context of this research. In the second section, the significance of project back-end capability is discussed in detail. The gap between the previously recognised value of project back-end capability and the research findings is highlighted by emphasising the importance of project back-end capability from a project owner's viewpoint. In the third section, the value of a multidisciplinary approach to the management of projects and benefits will be highlighted. By criticising the disjunction between the management of projects and benefits, the theoretical contribution of the multidisciplinary approach with dynamic

capability is highlighted. In the fourth section, the next agenda for the management of projects is proposed on the basis of key findings from this study. By discussing and criticising the classic project management body of knowledge models, an advanced knowledge model for the future of the management of projects is provided as further theoretical contribution.

Chapter 8, Concluding Remarks, summarises the overall research context, methodology, the results/findings and the key implications as the last chapter of this thesis. Then, two aspects of research limitations (four limitations) are highlighted: two limitations of data and two limitations of method. After that, the contributions and applications of the thesis are explained. Then, possible future research areas are suggested. As a final step, the original contribution of this thesis is emphasised and summarised.

1.5 Summary

To sum up, this chapter describes the potential contributions and necessity for this study by identifying the research background, objectives and initial research questions. Due to the lopsided project capability studies from a project supplier's perspective, little research attention has gone to the significance of a project owner's capability to realise post-implementation benefits from an IS project. Most project capability studies have focussed on how to maximise the managerial performance of the IS project itself without concrete consideration of operational benefits after implementation. In this context, this thesis takes a nuanced position on a project owner's dynamic capabilities (project benefits realisation) and a project supplier's operational capabilities (project execution).

In addition to the research context, an explanation of the research process is provided. In light of adopting a content analysis method, NAO reports are chosen as the source of data. Then, detailed information on how the literature review is organised and carried out is provided. Last, the overall structure of thesis is briefly explained.

The next chapter starts with the first part of the literature review, focussing on capabilities and dynamic capabilities in project management disciplines.

CHAPTER 2. CAPABILITIES IN MANAGING PROJECTS

2.1 Chapter Overview

In this chapter, previous studies on managing capabilities and projects will be reviewed as the initial step of the literature review. First, the key concepts of this chapter will be defined, including capability, organisational capability, dynamic/operational capability and the management of projects. In terms of the concept of capability, for example, a degree of uncertainty surrounds the terminology with respect to similar terms, such as competency and competence. After clarifying this, an organisational capability will be defined within a business and management context to make the meaning clear. Then, the concept of dynamic/operational capability will be introduced; this concept is associated with a large and growing body of literature in the strategic management field. In addition, the contexts of project, project management and programme management will be outlined. The debate on distinguishing the concept of project and programme will also be reviewed to clarify the terms' meaning in this thesis. With respect to the concept of the management of projects, Morris' (2013) approach and framework (Management of Projects) will be analysed in detail as the author's framework is the base knowledge of this thesis.

The second section will address capability studies within the context of project organisations and environment in order to investigate the position of organisational capabilities in managing projects. To do so, the conceptual origin of project capability and its research trends will be introduced first. Then, the managerial roles of two main project organisations, suppliers and owners, will be emphasised to distinguish between the two in terms of capability; as explained in the research background section (chapter 1.2.1), this thesis uses the term 'owner' rather than 'client' to signify a project owner's accountabilities and ownerships with regard to IS benefits realisation and management.

By drawing on the conceptual clarification of capabilities and project management, project capabilities and the importance of project owners' point of view will be argued. In response to the literature review, the research context of this thesis will be suggested as the final section of this chapter. By highlighting a knowledge gap in the field of study, the original research contribution of this thesis will be emphasised.

2.2 Definitions and Conceptual Origins

2.2.1 Capability and Organisational Capability

A common understanding is that a capability refers to a capacity to perform a particular task, function or activity. Though the term was infrequently mentioned in the management literature a decade ago, a considerable amount of literature has been published with the concepts of capability and competency in social science studies (Finegold *et al.*, 1998). Broadly, two main bodies of research have discussed the value of capability.

On the one hand, the strategic management literature discusses the concept of capability within the domain of business strategy. It takes a resource-based view of the firm (Wernerfelt, 1984) and draws on the organisational capabilities (Barney, 1991; Chandler, 1990; Leonard-Barton, 1992; Winter, 2000). A capability is defined as an essential factor for companies to achieve strategic differentiation and sustain organisational change (Leonard-Barton, 1992; Bresman, 2000; Salaman and Asch, 2003). From a strategic management perspective, capabilities have been considered as a compilation of knowledge, skills, routines and abilities built in the organisation which are brought together to accomplish work (Nelson, 1991; Dosi *et al.*, 2000). That is, organisational capabilities are a combination of competencies of an organisation's individuals and are the abilities that enable the organisation to conduct its business activities (Dosi *et al.*, 2000). Broadly, the notion of organisational capabilities considers managerial aspects such as "processes, management, coordination and governance" (Kogut and Zander, 1992; Melkonian and Picq, 2011, p. 457).

On the other hand, the human resource development and management literature tends to mix the concepts of capability and competence from a managerial perspective. This body of work focusses on the individual knowledge, skills, traits, attributes and behaviours required to carry out functional roles (Stamp, 1981; Cave and Wilkinson, 1992; Sandberg, 2001; Le Deist and Winterton, 2005; Königová *et al.*, 2012). Similarly, Stephenson (1994) defines a capability as the combination of knowledge, skill and individual qualities.

Broadly, two approaches reveal a certain level of similarity and dissimilarity in tone of argument; capability refers to a capacity to carry out certain tasks and activities, but it can be differentiated as to whether it focusses on individual or organisational values. However, numerous studies have attempted to explain what both capabilities and competencies genuinely mean but without a clear distinction between the two (Stalk *et al.*, 1992; Javidan, 1998; Mohrman *et al.*, 1998). Several researchers have mentioned confusion between the terms capability and competency. Stalk *et al.* (1992) claim that although researchers have given their attention to distinguishing between capabilities and competencies, clearly defined descriptions are not yet provided.

Javidan (1998) points out that capabilities and competencies can be regarded as synonymous, and they are defined as the combination of production technologies and skills. The author provides a hierarchy model to compare a capability to a competency in a firm's strategic model: resource-based capabilities and competencies influence functional strategies and business strategies, respectively (see details in Figure 2-1).

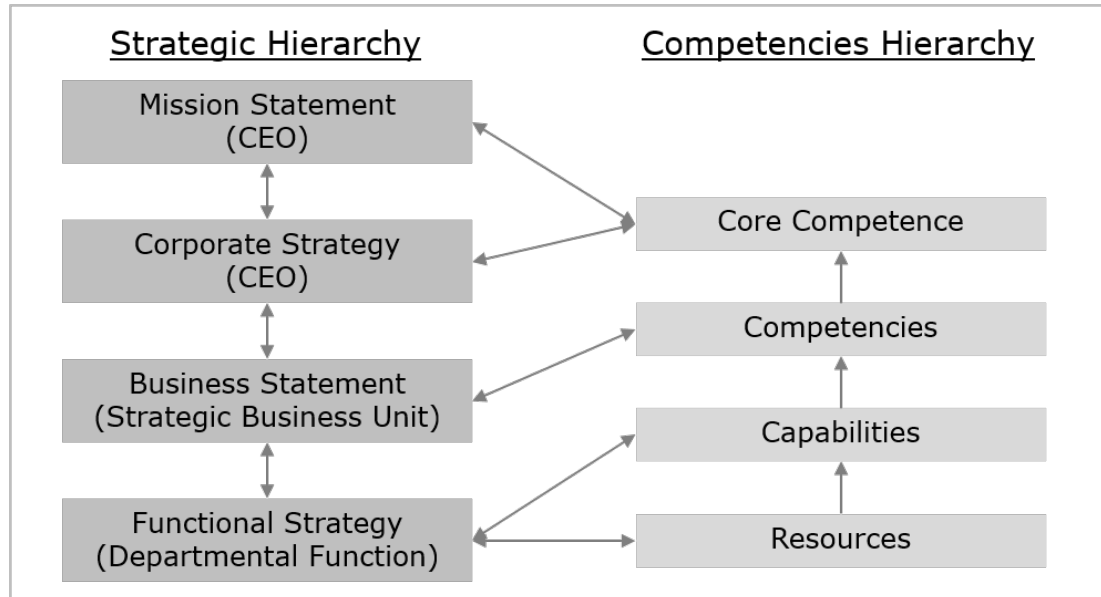


Figure 2-1: Capabilities/competencies and strategic hierarchy (Javidan, 1998)

In contrast, Smith (2008) identifies the concept of capability at an organisational level of analysis where a competency is defined as an individual or technical skill. Figure 2-2 describes Smith's hierarchy with his key ideas.

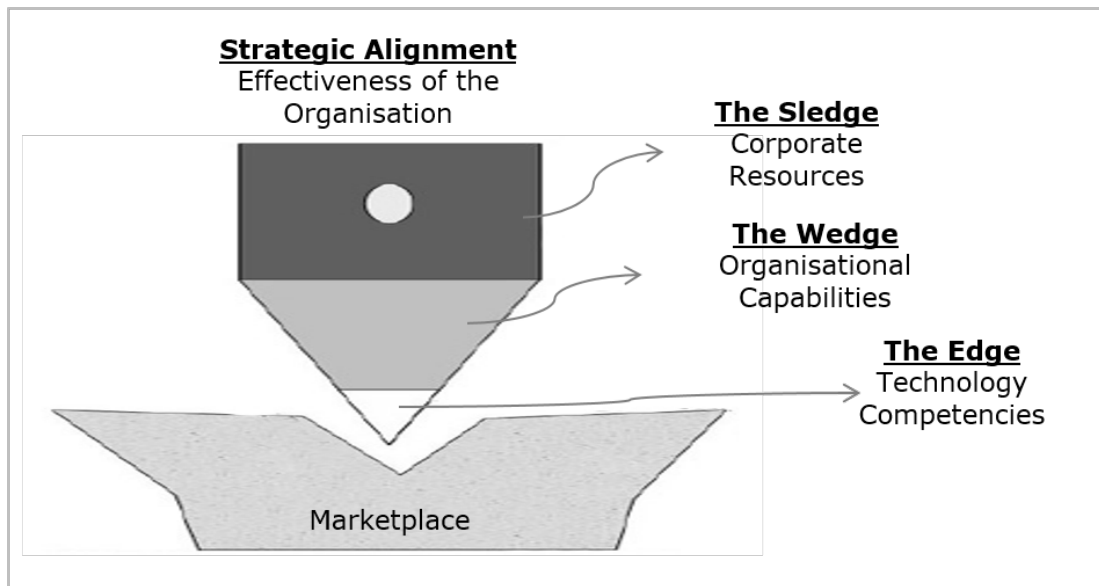


Figure 2-2: Strategic alignment between capabilities and competencies (Smith, 2008)

In the context of the management of projects, Morris (2013) explains the difference between the conceptual definitions of competency and capability within a project management environment. By highlighting the conceptual diversity between the two, the author defines the idea of competency as individual knowledge, skill and behaviour (UK perspective) or as individual superior performance (US perspective). There is a slight difference in the shades of meaning between the two perspectives. Thus, the concept of competency within the UK perspective implies the combined knowledge, skill and behaviour that a person needs to perform in a work role. In contrast, individual competency is explained as the level of performance to achieve certain tasks within the US viewpoint. Even so, it can be acknowledged that both of them consider competency as an individual value. Morris (2013) introduces the elements of project management capability with a diagram, including the concepts of competency, capability, maturity, project and programme. Figure 2-3 describes his point of view on the theoretical position of competency and capability in a project management environment.

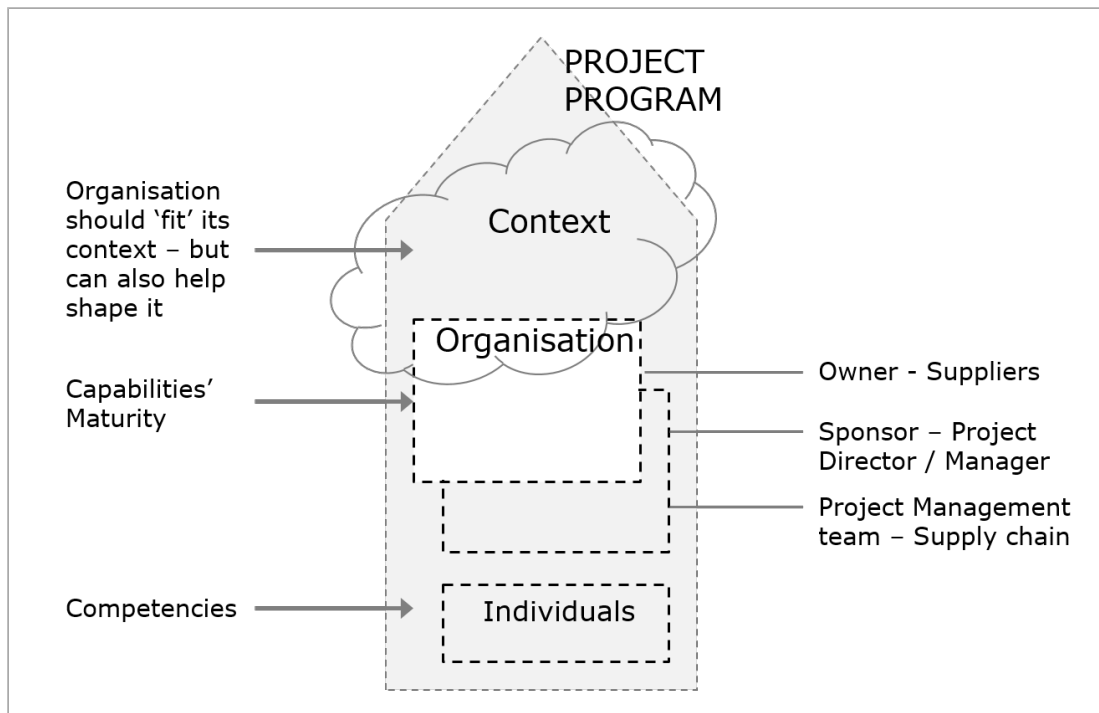


Figure 2-3: Elements of project management capability (Morris, 2013, p. 225)

Within the perspective of benefits management, Ward and Daniel (2012) show their point of view in distinguishing the concepts of competency and capability from a resource-based perspective. Similar to the other perspectives introduced above, the concept of capability is defined as an ability related to the achievement of organisational strategies. The concept of competency is defined as an organisational activity involving how organisational resources are deployed to achieve the activities required by the organisation. By providing five steps, as below, the authors describe the relationship amongst resources, competences, balance of deployment, assessment of environment and strategic capabilities (Ward and Daniel, 2012). From level 0 to level 4, the aspects are systematically connected and influence each other. On the basis of resource facilitation, competences are developed, and this has an impact on strategic capability through the balance of deployment and assessment of the external environment (Johnson and Scholes, 1999; Ward and Daniel, 2012). Below is a list of the four levels with descriptions:

- Level 0: Resources (Physical, human, financial and intangible)
 - Necessary or unique resources
- Level 1: Competences (Key activities or linking competences)

- Threshold or core competences
- Level 2: Balance of deployment
- Level 3: Assessment of environment
- Level 4: Strategic capabilities
 - Fit to current environment or stretch to allow innovation

Amongst this diversity, this thesis takes forward the conceptual notion of capability that emphasises the organisational aspect in a manner similar to the strategic management studies; capabilities in this thesis refer to organisational capabilities. The concept of capability in the strategic management field has been established with a more consistent view than the one in the human resource development and management literature. In this thesis, ‘capabilities’ are clearly distinguished from ‘competencies’, which are “work-related knowledge, skills and abilities” (Nordhaug and Gronhaug, 1994, p. 90; Delamare Le Deist and Winterton, 2005), that is, the skills and knowledge held by individuals. Thus, the collective individual competencies can facilitate organisational capabilities to achieve certain organisational goals.

2.2.2 Dynamic/Operational Capability

As explained in the previous section, the concept of organisational capability and its facilitation has become a key agenda item in business and management studies. However, almost certainly, there has been no clear distinction of organisational capabilities whether the focus should be on operational routine or business change. As organisational change and its management has become a critical issue in any business environment, advancing organisational capability studies was required. Through these efforts, the concept of dynamic capability has emerged.

Since Teece and Pisano (1994) published their work on dynamic capabilities, numerous relevant studies have appeared in strategic management research (e.g. Spender, 1996; Zollo and Winter, 2002; Winter, 2003; Teece, 2007). The concept of dynamic capability is placed within the flow of business change and improvement. Table 2-1 summarises the diverse definitions of dynamic capability. In this regard,

certain keywords describe the key features of the concept, such as organisational resource and business routine.

Table 2-1: Definitions and concepts of dynamic capability

Author, Year	Descriptions
Collis, 1994	Strategic insights that derive from managerial and entrepreneurial capabilities: govern the rate of change of operational capabilities
Teece <i>et al.</i> , 1997	The firm's ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments
Eisenhardt and Martin, 2000	The firm's processes that use resources to match and create market change; organisational and strategic routines by which firms achieve new resources configurations
Pisano, 2000	Regulate the search for improved routines
Rosenbloom, 2000	The ability to achieve new forms of competitive advantage
Zollo and Winter, 2002	A learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness
Zott, 2003	Organizational processes and activities that guide the evolution of a firm's resources, capabilities, and operational routines
Helfat <i>et al.</i> , 2007	The capacity of an organization to purposefully create, extend or modify its resource base

Clarifying the concept of dynamic capability is critical to carry out this study. As introduced above, the conceptual coverage of dynamic capability has still been a controversial topic in business and management studies (Helfat *et al.*, 2007; Peteraf *et al.*, 2013; Li and Chan, 2016). There is a need of understanding the conceptual origin and research trend of dynamic capabilities.

Two principal lines of enquiry have evolved in the literature (Di Stefano *et al.*, 2010; Peteraf *et al.*, 2013) - those who follow Teece *et al.* (1997) with a focus on achieving competitive advantage by modifying and creating new operational capabilities, and those who follow Eisenhardt and Martin (2000) and are more focussed on moderately-dynamic and volatile conditions. According to Teece *et al.*'s definition, a

dynamic capability is defined as “the firm’s ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments” (Teece *et al.*, 1997). In this conception, dynamic capabilities refer to organisational processes and patterns of current practice and learning by altering the organisation’s resource base. Based on this approach, they argue that dynamic capabilities are able to provide new strategic alternatives for the firm as a source of sustainable advantage.

As the second principal line, subsequent research expanded the original definition of dynamic capability by Eisenhardt and Martin (2000). The authors define a dynamic capability as “the firm’s processes that use resources to match and create market change; organisational and strategic routines by which firms achieve new resources configurations” (Eisenhardt and Martin, 2000). Thus, the authors extended the original concept of dynamic capability to include the creation of market change as the form of organisational processes as well as the response to exogenous change (Helfat *et al.*, 2007, p. 3). For instance, they provide a few examples of dynamic capabilities as knowledge transfer, product development routines, alliance acquisition capabilities, resource allocation routines and replication routines (Eisenhardt and Martin, 2000).

Later, in similar manner to Eisenhardt and Martin’s approach, Zollo and Winter (2002) define a dynamic capability as “a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness”. The authors focus on the importance of approach for improving business routines to react to and govern the level of change in operational capabilities - capabilities for modifying operational routines. In this context, Winter (2003) classified organisational capabilities based on their purpose by two types: operational and dynamic capabilities. Ordinary organisational capabilities are conceptualised as firms’ abilities to ‘make a living’, synonymous with operational capability.

In order to compile the extant literature on the theoretical coverage of dynamic capabilities, Helfat *et al.* (2007) broadly define a dynamic capability as “the capacity of an organization to purposefully create, extend, or modify its resource base” (2007, p. 4). In this thesis, Helfat *et al.*’s definition is adopted to clarify the conceptual coverage of dynamic capabilities. Thus, this thesis follows the broader concept of

dynamic capabilities that cover both Eisenhardt and Martin’s (2000) and Zollo and Winter’s (2002) approaches. For example, dynamic capabilities may or may not be competitive advantages, but they provide a potential continuing source of competitive advantage:

“Although firms pursue greater effectiveness of their operating routines, they may or may not achieve it. Hence, the definition of dynamic capabilities does not suffer from any sort of tautology with regard to the superiority of performance”.

(Helfat et al., 2007, p. 3)

Figure 2-4 outlines the theoretical position of dynamic capabilities within the context of project management that this thesis addresses. There are three stages in this diagram: legacy operation, project and improved operation stages. During the legacy operation stage, resource-based operational capabilities are required to obtain competitive advantages. After that, when a project is initiated and executed to aim for operational improvement, there is a need to reconfigure operational capabilities for project benefits realisation. Consequently, for a project owner, the necessity of dynamic capabilities is critical for alignment with the realisation of benefits from the project.

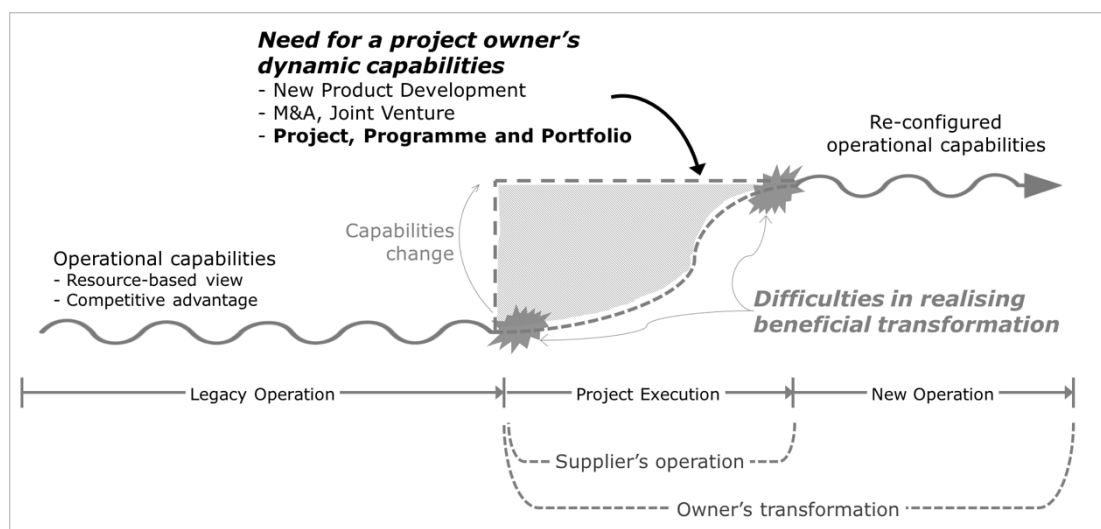


Figure 2-4: Theoretical position of dynamic/operational capabilities in project and operation management

To sum up, a dynamic capability can be defined as a capacity for improving organisational routines to purposefully create, modify and extend an organisation's resources, rather than the role of operational capability which focusses on simple problem solving and job accomplishment. Moreover, this conception adopts the wider approach by covering Eisenhardt and Martin's (2000) and Zollo and Winter's (2002) approaches. In this thesis, the concept of dynamic capability will be applied to an IS project management environment where organisational change is the key issue, and this will be explained in detail in section 2.3, Organisational Capability in Managing Projects.

2.2.3 Management of Projects

Definition

Scholars have defined the concepts of project and project management, and two of the latest and officially established principles are the Association for Project Management Body of Knowledge (APMBoK) and Project Management Body of Knowledge (PMBoK), published by the Association for Project Management in the UK and the Project Management Institute (PMI) in the US, respectively. On the basis of the two publications, Table 2-2 explains the concepts and features of project and project management that are widely used in project management disciplines.

Table 2-2: Project and project management

	APMBoK (APM, 2012)	PMBoK (PMI, 2013)
Project (Definition)	A unique, transient endeavour, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes or benefits	A temporary endeavour undertaken to create a unique product, service or result
Characteristics of project	<ul style="list-style-type: none"> • Unique • Transient endeavour • Cross-functional • Uncertainty 	<ul style="list-style-type: none"> • Temporary • Unique products, services or results • Progressive elaboration
Project management	Project management is the application of processes,	The application of knowledge, skills, tools and

(Definition)	methods, knowledge, skills and experience to achieve the project objectives	techniques to project activities to meet project requirements
Structure (Knowledge areas)	Context, planning, executing, techniques, business and commercial, organisation and governance, people and profession	Integration, scope, time, cost, quality, human resource, communication, risk, procurement

Project Management Disciplines

The concept of project has existed for a very long time in human nature. Theoretically, project and project management as formal terms entered use in the US defence/aerospace sector after 1952-1953. Then the concept evolved and expanded to engineering, construction and other diverse sectors. Project management has become a well-defined approach to facilitate business change (Morris, 2013). Though its theory and practice was developed from the construction and aerospace industries, it has also spread to diverse industries, including information systems.

Morris (2013) summarises the history of project management disciplines by 10 stages from 1953 to 2013. As seen in Table 2-3, the concept of project has continually evolved within the perspective of project process and execution. Then, diverse aspects such as organisational and environmental issues have been considered to advance the project management disciplines. In particular, project front-end and programme management have been introduced from the 1990s with the enhanced BoKs. Thus, not only the project execution itself but also the realisation of business change, value and benefits have been examined recently.

Table 2-3: 10 stages of project management (PM), or how the discipline developed, 1953-2013 (Morris, 2013, p. 110)

Stage	Description
Planning and control: 1900-1970s	<ul style="list-style-type: none"> • Early planning and control tools 1900+ • (No evidence of PM before ~1953)
Engineering complexity and urgency: 1953+	<ul style="list-style-type: none"> • PM ‘invented’ by USAF for missile programs circa 1954 - systems thinking, planning and control; immediately followed by US Navy • Then DoD and NASA institutionalise: PERT, CM,

	<p>WBS, PBS, EVA, C/SCSC. Stage-gate process. Leadership. All this, to address technical complexity + urgency. PM acted as a form of engineering management.</p> <ul style="list-style-type: none"> • Environmentally sheltered. • Integration, contingency theory • Scandinavian School – temporary organizations (1990s)
The organisation theorists: late 1960s+	<ul style="list-style-type: none"> • Environmental issues became intrusive and disruptive: TransAlaskan Pipeline, North Sea, Concorde. New environmental awareness began - stakeholder management, cost-benefit • PMBOK Guide - process and execution oriented
Environmental awareness: 1970s	
Front-end definition: 1990s+	<ul style="list-style-type: none"> • ‘The Management of Projects’ paradigm • New BOKs - APM, IPMA, ENAA/JPMS
Lean Management and relationships: 1990s	<ul style="list-style-type: none"> • New Product Development/ Toyota: Concurrent Engineering • Lean, TQM, partnering, relationships
Enterprise-wide project management: 1995+	<ul style="list-style-type: none"> • ICT, PMOs, maturity, Knowledge Management, Project/Organizational Learning • OGC Program Management - Change Management, benefits, value
Governance: 2000+	<ul style="list-style-type: none"> • Sponsor, governance, strategy, reviews/audits • Financial stringency - BOT/PFI: WLC (Whole Life Costs); risk [behavioural economics]. Effectiveness [Miller & Lessard] • Japanese BOK
Agility: 2005+	<ul style="list-style-type: none"> • Micro projects - Critical Chain, Agile
Relevance: Today	<ul style="list-style-type: none"> • Dramatic societal challenges – 2050, etc. • Projects and programmes more interdependent, less ‘mechanistic’ • Funding a major issue • So too is competency, quantity of senior PM staff and integrated supply chains • Need ‘dispersed intelligence and ownership’ - Communities of Practice, ICT • More value-driven approach • Leadership crucial.

Knowledge Areas of Project Management Disciplines

Diverse research topics and knowledge areas on project management have been revealed and covered by widely known project management body of knowledge models and multidisciplinary scholars. In 1996, PMI published the first edition of PMBoK to officially put project management knowledge, processes and issues together. This PMI's PMBoK has gone into several revisions, and now the 5th edition is the most up-to-date guide; PMI is currently in the process of developing the 6th edition. Figure 2-5 summarises the nine knowledge areas and sub-processes identified by PMI's PMBoK: Integration, Scope, Time, Cost, Quality, Human Resource, Communications, Risk and Procurement (PMI, 2013). As seen in Figure 2-5, most knowledge topics are based on project execution itself, which does not fully cover project front-end and back-end issues.

<p>Project Integration Management</p> <ul style="list-style-type: none"> • Develop project charter • Develop preliminary project scope statement • Direct and manage project execution • Monitor and control project work • Integrated change control • Close project 	<p>Project Scope Management</p> <ul style="list-style-type: none"> • Scope planning • Scope definition • Scope WBS • Scope verification • Scope control 	<p>Project Time Management</p> <ul style="list-style-type: none"> • Activity definition • Activity sequencing • Activity resource estimating • Activity duration estimating • Schedule development • Schedule control
<p>Project Cost Management</p> <ul style="list-style-type: none"> • Cost estimating • Cost budgeting • Cost control 	<p>Project Quality Management</p> <ul style="list-style-type: none"> • Quality planning • Perform quality assurance • Perform quality control 	<p>Project Human Resource Management</p> <ul style="list-style-type: none"> • Human resource planning • Acquire project team • Develop project team • Manage project team
<p>Project Communications Management</p> <ul style="list-style-type: none"> • Communications planning • Information distribution • Performance reporting • Manage stakeholders 	<p>Project Risk Management</p> <ul style="list-style-type: none"> • Risk management planning • Risk identification • Qualitative risk analysis • Quantitative risk analysis • Risk response planning • Risk monitoring and control 	<p>Project Procurement Management</p> <ul style="list-style-type: none"> • Plan purchase and acquisitions • Plan contracting • Request seller responses • Select sellers • Contract administration • Contract closure

Figure 2-5: Project management knowledge areas in PMI's PMBoK model (PMI, 2013)

In order to overcome the limitations of PMI's approach, APM developed the APMBoK model by covering wider project management knowledge areas such as objectives, strategies, techniques, business and commercial, organisation and governance and people and the profession (APM, 2012). In particular, the APMBoK

covers project benefits management, value management and organisational governance issues, which are not covered in the PMI's model. The list below summarises the project management knowledge areas identified in the APM's APMBok model:

- General - Project management, programme management, portfolio management, project context, project sponsorship, project office
- Strategic - Project success criteria and benefits management, stakeholder management, value management, project management plan, risk management, quality management, safety, health and environment
- Executing the strategy - Scope management, scheduling, resource management, budgeting and cost management, change control, earned value management, information management and reporting, issue management
- Techniques - Requirements management, development management, estimating, technology management, value engineering, modelling and testing, configuration management
- Business and commercial - Business case, marketing and sales, financial management, procurement, legal awareness
- Organisation and governance - Project life cycles concept, project reviews, organisation structure, organisational roles, methods and procedures, governance
- People and the profession - Communication, teamwork, leadership, conflict management, negotiation, human resource management, behavioural characteristics, learning and development, professionalism and ethics

Crawford *et al.* (2006) identify the research emphasis in the project management literature between 1994 and 2003. Through the analysis of IJPM and PMJ, the authors uncover a variety of previous studies on changes to the field. As seen in Table 2-4, most project management research topics have been examined within the management boundary of project suppliers' roles and responsibilities. Though some project owner issues such as strategic alignment and benefits management are covered, they are considered as studies on a project execution-based approach. "Interest in strategic alignment is also strong in IJPM and shows an increase in PMJ" (Crawford *et al.*, 2006, p. 180).

Table 2-4: Research topics and categories of project management (Crawford, 2004; Crawford *et al.*, 2006)

Category of Topic	Topic
Cost management	<ul style="list-style-type: none"> • Cost management
Cross unit outcomes	<ul style="list-style-type: none"> • Estimating • Integration management • Project context/environment • Project life cycle/phasing
Finalisation	<ul style="list-style-type: none"> • Project closeout/finalisation • Testing, commission, handover and acceptance
Interpersonal	<ul style="list-style-type: none"> • Conflict management • Leadership • Negotiation • Problem solving • Teamwork
Legal issues	<ul style="list-style-type: none"> • Legal issues • Safety, health and environment
Marketing	<ul style="list-style-type: none"> • Marketing
Product functionality	<ul style="list-style-type: none"> • Configuration management • Design management • Requirements management • Technology management • Value management
Programme management	<ul style="list-style-type: none"> • Programme management
Project evaluation and improvement	<ul style="list-style-type: none"> • Organisational learning • Performance management • Project evaluation and review
Project planning and control	<ul style="list-style-type: none"> • Change control • Project monitoring and control • Project planning
Project start-up	<ul style="list-style-type: none"> • Goals, objectives and strategies • Project initiation/start-up • Success (criteria and factors)
Quality management	<ul style="list-style-type: none"> • Quality management
Relationship management	<ul style="list-style-type: none"> • Benefits management • Document management • Information and communication management • Reporting • Team building and development
Resource management	<ul style="list-style-type: none"> • Personnel/human resource management

	<ul style="list-style-type: none"> • Procurement • Project organisation • Resource management
Risk management	<ul style="list-style-type: none"> • Risk management
Scope management	<ul style="list-style-type: none"> • Scope management
Strategic alignment	<ul style="list-style-type: none"> • Business case • Financial management • Project appraisal • Strategic alignment
Time management	<ul style="list-style-type: none"> • Time management

The Management of Projects: Peter Morris' Approach

Amongst the various project management topics, Professor Peter Morris has continually contributed to the project management disciplines in order to address the success or failure of managing projects (Morris and Hough, 1987; Morris, 1997; Morris, 2013). One of his first comprehensive research studies (Morris and Hough, 1987) reviewed reports on 1,653 projects and analysed eight major project cases to describe the key 'anatomy' of project success and failure:

“We found that typical sources of difficulty were such things as unclear success criteria, changing sponsor strategy, poor project definition, technology (fascination with; uncertainty of; design management), concurrency, poor quality assurance, poor linkage with sales and marketing, inappropriate contract strategy, unsupportive political environment, lack of top management support, inflation, funding difficulties, poor control, inadequate manpower, and adverse geophysical conditions”.

(Morris, 2013, p. 60)

To make the guidance clearer and more concise, the dozens of factors were condensed to 22 generic ones. By examining the cases which have a diverse level of technical uncertainty, the importance of organisational, political and environmental management perspectives is emphasised.

On the basis of his foundational work, Morris (1997) provides the 'Management of Projects' model by covering internal (e.g. structure, behaviour and systems) and external (e.g. location, geophysics and politics) aspects (Figure 2-6). By including

the environmental factors, the author highlights the significance of a more strategic approach to managing projects with the harmonisation between internal and external perspectives.

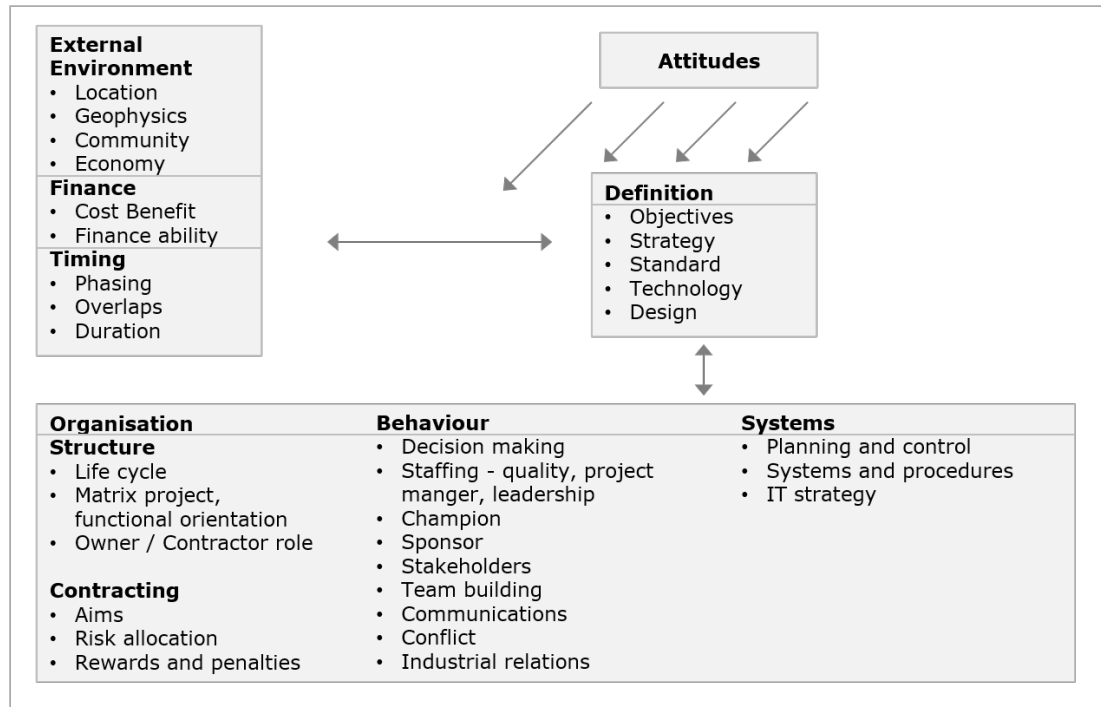


Figure 2-6: Management of projects (Morris, 1997, p. 218)

Morris (2013) has criticised the limitation of the modern project management approach (i.e. PMI’s PMBoK) by providing a revised framework, the Management of Projects (MoP); see details in Figure 2-7. The author points out that the managerial coverage of formalised project knowledge has not fully explored the MoP conception he highlighted. “The Management of Projects involves managing the definition and delivery of the project for stakeholder success. The focus is on the project in its context” (Morris, 2013, p. 62). Thus, he argues the necessity of project front-end management (project definition) rather than the execution-based PMI model (project delivery).

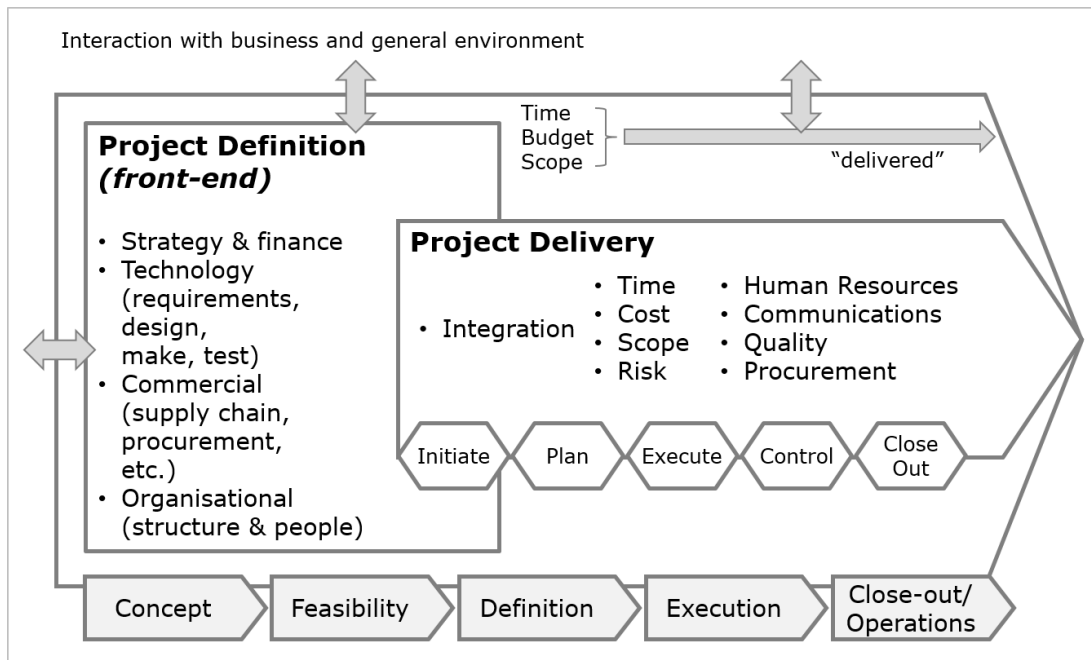


Figure 2-7: MoP - The management of projects (Morris, 2013, p. 62)

The above works make their own contributions to the future research direction of project management. At the same time, however, this direction also needs to be readdressed in detail. For instance, the MoP model clearly defines ‘what’ has to be considered, but it does not provide ‘how’ the concept of MoP can be applied to future theory and practice. Furthermore, it does not distinguish the roles and responsibilities of a project supplier and an owner that will be the main research theme of this thesis. In this regard, Pinto and Winch (2016) revisited the main research stream of Morris’ framework and its implication. In order to determine how the ‘settled normative best practice’ (PMI’s PMBoK) should be ‘unsettled’ (Morris’ MoP), the authors identify key areas in which further project studies can pursue the context of Morris’ MoP. Representatively, papers addressing the future direction of project management studies which can enhance the context of MoP are introduced, namely, Artto *et al.* (2016), Winch and Leiringer (2016) and Davies and Brady (2016).

2.2.4 Managing Projects and Programmes

The nature and facet of programme is a well-established approach for organising project-based change (Pellegrinelli, 1997). In this regard, increasing research attention has been paid to the context of programme and its necessity (Lycett *et al.*, 2004). The concept of programme has been applied to a wide range of organisational disciplines, such as working arrangements, organising frameworks, processes of change and mechanisms for creating capabilities (Pellegrinelli *et al.*, 2012). The major definitions of programme are shown in Table 2-5. Though researchers have provided slightly different definitions, programme can be conceptualised as ‘a group/set of related projects’ for ‘a common goal’ and ‘strategic direction’.

Table 2-5: Definitions of programme

Author, Year	Descriptions
Maylor, 2010	An organisational framework for grouping existing or defining new projects and for focussing all the activities required to achieve a set of major benefits. These projects are managed in a coordinated way, either to achieve a common goal or to extract benefits which would otherwise not be realised if they were managed independently.
Cabinet Office, 2011b	A temporary, flexible organisation created to coordinate, direct and oversee the implementation of a set of related projects and activities in order to deliver outcomes and benefits related to the organization’s strategic objectives. A programme is likely to have a life that spans several years.
APM, 2012	A group of related projects, which may include related business-as-usual activities that together achieve a beneficial change of a strategic nature for an organisation.
PMI, 2013	A group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Programs may include elements of related work outside the scope of the discrete projects in the programme.

There has been a continual debate on the theoretical nature of the programme - whether it is an extension of project management or a distinct discipline. For example, the Office of Government Commerce (OGC; 2009) highlights the difference between projects and programmes in terms of timescale (projects as shorter timescale; programmes as longer timescale). Many researchers have argued

that a 'programme' management approach and its techniques should not be same as those of a 'project' management approach (Pellegrinelli, 1997; Partington, 2000; Lycett *et al.*, 2004; Pellegrinelli *et al.*, 2007; Pellegrinelli *et al.*, 2012).

Based on consulting interventions and action research, Pellegrinelli (1997) suggests a research direction for the programme that facilitates organisational change and improvement. The author points out that "the relationship between a programme and a project is not the same as the relationship between a project and a work package; if it were, then the programme would essentially be a large project" (Pellegrinelli, 1997, p. 148). Thus, the distinctive nature and form of project and programme are emphasised.

Similar to this context, Lycett *et al.* (2004) perform a critical review of the concept of programme management. The authors argue that existing programme management approaches are almost the same as the context of the project, and they can lead to managerial concerns including an excessive control focus, insufficient flexibility in the context of an evolving business strategy and ineffective cooperation between projects within the programme (Lycett *et al.*, 2004); also, they could have a negative influence on the flawed belief that programme management is a scaled-up version of project management and a one-size-fits-all approach is appropriate. Later, Pellegrinelli *et al.* (2007) reveal the gap between published programme management principles and actual programme cases by analysing 'Managing successful programmes' by the OGC and 'six cases in commercial and public sector in the UK', respectively.

These studies imply that managing a programme is not about managing multiple projects but a unique way of achieving the strategic goals of an organisation. In other words, the significant point of the programme concerns how business benefits can be realised from project delivery, not the successful delivery of a project.

In this thesis, it is agreed that programme management does not mean the aggregation of multiple projects. However, this research argues that managing a single project also needs to consider its benefits realisation within the perspective of a project owner. The rationale is that the critical point of a project owner is how project deliverables can realise operational benefits as well as project success itself. Thus, the specific context of managerial differences between a project and a

programme is beyond the scope of this research, and the two concepts will not be disentangled in this thesis.

2.3 Organisational Capability in Managing Projects

2.3.1 Project Capability

Davies and Brady (2000) propose the concept of ‘project capability’ as an extension of Chandler’s (1990) framework. Project capability is defined as collective abilities such as knowledge, skills and relevant experience. Within the view of strategic management, Brady and Davies (2004) provide the concept of project capability as an organisational ability to mobilise resources towards strategic objectives. Since then, scholars have given their attention to the theoretical advancement of project capability within an organisational context (Söderlund, 2005; Bredin, 2008; Melkonian and Picq, 2011; Davies and Brady, 2016). Bredin (2008) emphasises ‘people capability’ by developing Davies and Brady’s (2000) model. In that paper, people (organisational) capabilities cover “experiences, individual skills, role structures, processes, activities and routines throughout the organisation” (Bredin, 2008, p. 574). Thus, project capability studies have focussed on the value of organisational capabilities as a mean of achieving strategic goals.

Researchers also emphasise the value of project capability for realising ‘business change’ (Brady and Davies, 2004; Ashurst *et al.*, 2008). Brady and Davies (2004) develop the Project Capability Building Model, which covers the relationship between organisational learning and project capabilities. This research model describes how project capabilities can be built through the organisational learning process, and it focusses mainly on a specific situation when firms move into new technology and market bases. In other words, developing project capabilities can be recognised as an essential aspect to ensure efficient business change and its benefits. However, this formulation of project capabilities does not distinguish between dynamic capabilities and operational capabilities (Winch, 2014), which represent ways to enhance business change and operational efficiency, respectively. That is, little empirical evidence shows how successful business change can be realised through project capabilities (Ashurst *et al.*, 2008). Moreover, applying the theory of

dynamic capability to a project management environment can trigger successful and stable business change and sustained organisational vitality (Ambrosini and Bowman, 2009; Pellegrinelli *et al.*, 2012; Davies *et al.*, 2016).

2.3.2 Project Capability and Organisations: A Project Owner

An undeniable research trend we can observe is that most project capability studies have been strongly biased towards a project supplier viewpoint (Godbold, 2016; Winch and Leiringer, 2016). Ethiraj *et al.* (2005) point out the importance of client-specific capabilities, but the point of view is that of a project supplier. Davies and Brady (2016) advance the context of project capabilities by distinguishing project capabilities at the operational and dynamic capabilities at the strategic levels by reviewing the various concepts of dynamic capabilities and organisational ambidexterity (exploratory and exploitative). Broadly, Davies and Brady's work relies heavily on the perspective of a project supplier and how this can be applied to a project-based firm in the private sector. Thus, the conceptual meaning and the viewpoint of project capabilities is different (i.e. between project capabilities for project based firms and for project owner organisations). There is a lack of recognition of differentiated business aims between project suppliers and owners. Recently, Davies *et al.* (2016) have analysed how dynamic capabilities emerge and are applied in different project domains, such as project owners and operators, by examining the case of the London Heathrow Terminal 5 project (Winch, 2014; Davies *et al.*, 2016).

On the basis of the supplier-biased research trend, most project management literature has been preoccupied with successful delivery of project outputs, with a lack of recognition of the business benefits and strategic values (Zwikael, 2016). From a project owner's viewpoint, successful business change cannot be completed during a project life cycle (Shenhar and Dvir, 2007; Zwikael and Smyrk, 2012; Breese *et al.*, 2015); overall business performance can be evaluated and improved through the reliable operation of IS project deliverables (Godbold, 2016). Thus, a project owner needs to consider the realisation of post-implementation benefits as well as the project accomplishment itself. In order to deal with successful business change and benefits, a project owner's capabilities need to be understood within a

wider approach by recognising the managerial continuity from the project stage to the operation stage (Pellegrinelli, 1997; Godbold, 2016; Zwikael, 2016).

To make this feasible, the concept of project owner needs to be defined more precisely. Morris and Hough (1987) introduce the concept of ‘strong owner’. In their foundational work, *The anatomy of major projects*, the authors capture the challenges of eight project cases including the computerisation of tax payment process (chapter 8 in their book). Then, they highlight the importance of “government’s role as the direct owner of a major project” (Morris and Hough, 1987, p. 224). However, the contextual meaning of strong owner is within the boundary of contractual matters, as a purchaser of products and services needed by the project. Similarly, Aritua *et al.* (2009) suggest the concept of the ‘intelligent client’, but in their definition, the role of client is still limited. In other words, the importance of organisational/relational connectivity between project and operation is not covered and the definition of owner project capabilities is still imprecise to date (Flowers, 2007; Winch, 2014; Winch and Leiringer, 2016).

In Godbold’s (2016) recent paper, the author points out that there is little attention on different skills between client project managers (client side) and delivery project managers (supplier side). This lack of clarity about the competencies and responsibilities between a project supplier and a client “results in projects not delivering benefits, frustrated deliverers and sponsors, widespread angst and re-works” (Godbold, 2016, p. 62). In order to formulate this differentiation, required competencies and responsibilities of two organisations are suggested. For example, the context of client project managers covers the strategic context including the operational benefits mechanism and the commercial arrangement of projects. In contrast, the roles and responsibilities of delivery project managers are focussed on the delivery of the contract and bridging the skills between sub-contractors and project owners. The author contributes to research on the necessity of the two differentiated approaches. However, the roles of the client are still weighted towards project commercial issues within the perspective of individual competencies.

2.4 Gap Identification and Summary

Summing up, this chapter started by defining the key concepts of this thesis. First, the concept of organisational capability was defined by reviewing the literature on capability management. To clarify its meaning more precisely, synonymous terminologies such as competency were reviewed, and two main research streams, strategic management and human resource development and management, were found. Second, the research notion of dynamic capability was investigated, which is highly relevant to business change and improvement. Third, the definitions of project and project management were also provided to apply the concept of dynamic capability. Fourth, the literature on project capability and its importance as a means of organisational change and improvement was reviewed; the significance of a project owner's role was also emphasised.

In response to the literature review, several research gaps have been identified, and they justify the need for this research agenda. Theoretically, this thesis enlarges the roles of the project 'client' to maximise the efficiency of operational benefits as a project 'owner' (activator for business change and operation). By settling the concept of 'owner' instead of 'client', the significance of the roles, responsibilities and capabilities of project owner organisations can be emphasised.

In addition, little research attention has been given to the distinctive capabilities of the project owner side. The business aim of suppliers is to make the delivery of the project output a success: to schedule, to budget and to fulfil the required specification as defined in their contract with the owner. However, the owner has a different perspective. The successful delivery of project output is definitely important to a project owner, but this does not guarantee the project owner's operational excellence (Winch and Leiringer, 2016). In other words, a project owner's capability should consider a wider perspective relating the operational business to the project itself. On the basis of this argument, this thesis proposes dynamic capability as the project capability of the project owner side. As mentioned in the previous literature review, dynamic capability has become the key theory of business and management research to contribute to successful business change and improvement. By adopting dynamic capabilities as a project owner, proper business change after a project can be carried out, and newly configured operational capabilities can also be facilitated efficiently.

In order to build up the theory of owner dynamic capabilities in IS projects, this study follows Eisenhardt and Martin's (2000) approach. They consider dynamic capabilities as catalytic capabilities by focussing on improving organisational processes and routines, rather than generating performance outcomes directly. Similarly, a project owner's capabilities need to focus as much on post-implementation benefits as direct performance of the project itself. Second, the public sector is an environment of medium or low velocity of technological change compared to some areas of the private sector. Drawing on this literature, this thesis defines owner dynamic capability as the dynamic capability required by project owners in order to efficiently initiate, execute and close out an investment project and also to bring the reconfigured operational capabilities into beneficial use. The theoretical framework will be advanced in the next chapters by understanding the key context of IS and its benefits (chapter 3) and public sector practice (chapter 4).

CHAPTER 3. INFORMATION SYSTEMS AND BENEFITS REALISATION

3.1 Chapter Overview

This chapter, the second part of the literature review, will cover the research on information systems projects and benefits realisation management. Information systems have been continually developed, and newly advanced technologies have also been evolved. In order to implement them, a form of project has become an evident phenomenon in most organisations to create new business benefits or to cope with business change and improvement. This chapter will review various literature related to IS projects and benefits management.

With respect to the use of terminology, this thesis considers that the term information system has a wider context than information technology. Since IS scholars have had a vigorous debate about the conceptual difference between two, it has largely been unexamined lately. However, it is still a widely held view that academics use both concepts together without a clear meaning. In this regard, researchers at the Florida Institute of Technology provide definitions of the terms as below (Florida Tech, no date).

- Information system is an umbrella term for the systems, people and processes designed to create, store, manipulate, distribute and disseminate information. The field of information systems bridges business and computer science.
- Information technology falls under the IS umbrella but deals with the technology involved in the systems themselves. Information technology can be defined as the study, design, implementation, support or management of computer-based information systems.

Broadly, information system refers to any system making use of technology, and the information system is concerned with information management and computing in general. Information technology, on the other hand, focusses on the technological aspects and how they support the dissemination of information (Heeks and Bhatnagar, 1999; Florida Tech, no date).

Based on this context, first, a general explanation of IS projects will be provided. In addition, the published standard model of the IS project life cycle will also be outlined. To investigate the issues of benefits management from information

technologies, the understanding of IS implementation and its life cycle is essential in a process view. After that, technological changeability/uncertainty and its impact on managing IS will be examined. Second, the academic origin of benefits realisation and its management issues will be studied. In particular, the benefits from IS and management will be covered in this section, before identifying the research gap between the literature and this research.

3.2 Information Systems and Project

3.2.1 Information Systems Project and Life Cycle

Numerous researchers and information systems standards have suggested the life cycle model for implementation of IS. The standards, ISO 12207 and IEEE standard 1074, provide the process model for software life cycle and the standard for developing software life cycle processes, respectively (IEEE Standard Association, 1997; IEEE/EIA, 1998). In the case of published works, researchers and various guides have tried to standardise the IS project life cycle from project initiation to closing out (Bennatan, 1995; Royce, 1998; Jurison, 1999; Favaro, 2010; APM, 2012; PMI, 2013). Cha (2012) synthesises the IS project life cycle models in eight fundamental stages: initiation, requirement analysis, planning, prototyping, analysis and design, implementation, test and transition and closing. Figure 3-1 summarises project management life cycle models in the literature. As seen in the diagram, there is a problematic issue in that none of them represents the stage of the delivery of benefits from project outputs. The figure is followed by a detailed explanation of flaws.

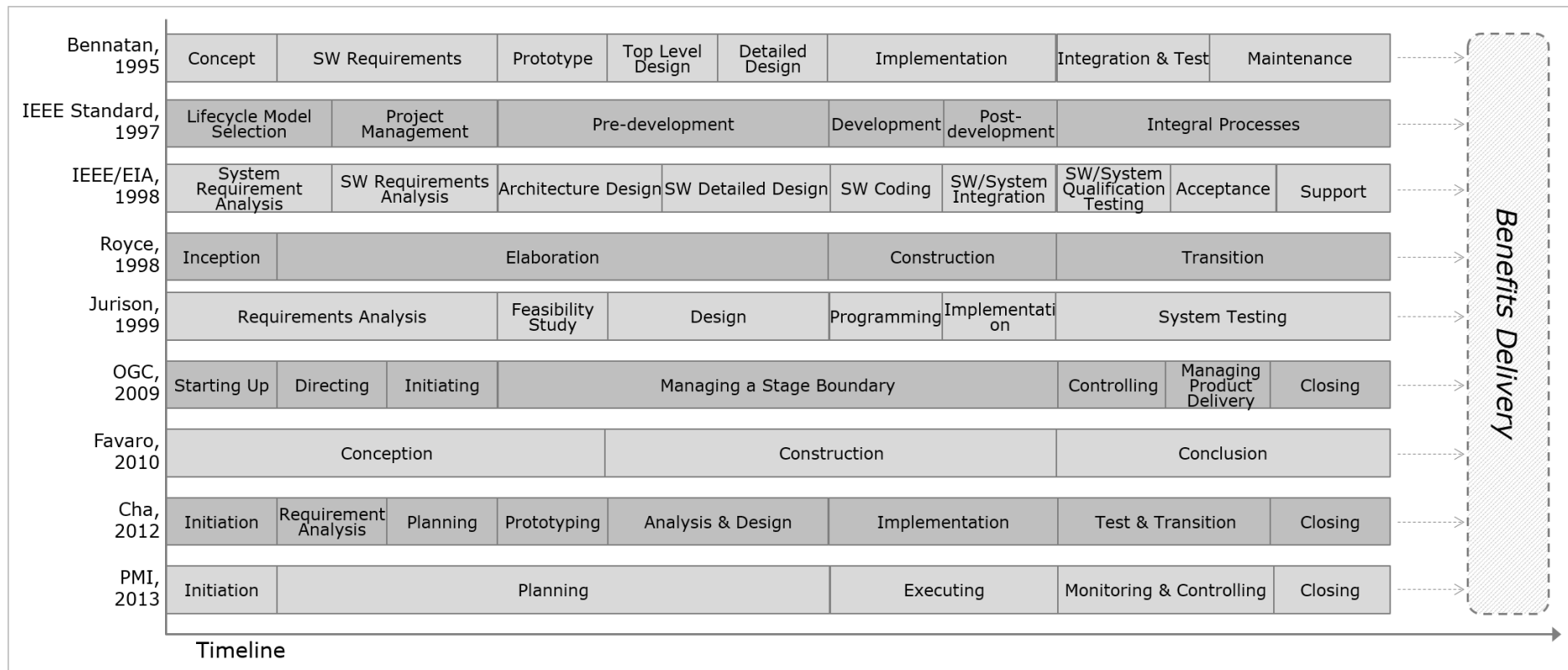


Figure 3-1: General and information systems project management life cycle models in the literature

Information systems have been researched and implemented on the basis of the standardised life cycle models and methodologies. Moreover, managing the project life cycle through phases has been regarded as the enabler for improving managerial control (PMI, 2013). For example, Smith (2007) highlights the importance of managing the project life cycle as projects become more complex due to a wider variety of processes and tasks. However, a few major problems with this kind of application can be seen within the perspective of performance and benefits from IS. An increasing concern has been raised that previous project management and life cycle studies tend to emphasise certain phases such as planning and implementation. Havila *et al.* (2013) criticise previous research on project capabilities and competencies for focussing only on the early and middle stages of managing projects. In addition to this internal concern about the life cycle, managerial coverage needs to be expanded to ‘before’ and ‘after’ the project to realise the benefits from IS. In particular, the benefits of IS cannot be realised during the project life cycle, and operational management issues should be considered during management of the project. The thesis raises this as a critical problem in terms of realising operational benefits from projects.

3.2.2 Complexity and Uncertainty of Project and Information Systems

The complexity of projects often causes a level of uncertainty in managing them. Due to the key characteristics of projects such as objective-led uniqueness, diverse factors have influenced the difficulty of managing projects. In this regard, Wirick (2011) lists the differences in project attributes between simple and complex projects. By comparing the two, the author highlights the complexity of projects and the impact on project management attributes. Table 3-1 summarises 15 project attributes and their influence on both simple and complex projects.

Table 3-1: Simple versus complex projects (Wirick, 2011, p. 239)

Project Attributes	Simple	Complex
* Environmental conditions	Ordered	Chaotic
* Stakeholder	Clear and bounded	Emerging and uncertain

interactions		
* Organisational form	Hierarchical, traditional	Network organisation
* Problem dimensions	Known problem with known outcome at initiation	Wicked problem with uncertain outcome
* Level of project manager influence	Able to manage activities and short deliverables, direct control of project personnel	Limited to ability to create broad rules for interactions and performance, indirect
* Technology used in the solution	Known	New and unfamiliar
* Environmental turbulence	Low levels of turbulence, conflict and volatility	High levels of turbulence, conflict and volatility
* Project duration	Short, foreseeable future	Longer, stretches into an unknown future
* Potential for uncertain events	Low, all variables exist inside the system	High, many outside variables are involved
* Organisational impact	Tactical impact only for project outcomes	Strategic impact of project outcomes
* Characteristics of systems influenced by the project	Closed, fixed and known	Open, emergent
* Organisational rule development	Formal, top-down, articulated in writing	Informal, created by groups, articulated by behaviour
* Level of knowledge work	Limited involvement of knowledge workers	Full involvement of knowledge workers
* Requirements for innovation and group learning	Innovation requirements are limited, solutions and processes are well defined and tested, required learning is limited and individual	Innovation required for solutions and processes, substantial learning is required and is at the group level as well as individual
* Stakeholder interests	Interests known, homogenous and uniform	Interests unknown, diverse or in conflict

In the case of IS, the complexity and uncertainty of managing projects can be more serious than in other types of projects. A form of project has been recognised as one of the most suitable approaches in recent times to develop new IS or to change/improve legacy systems. Various issues such as systems change, high technology capital goods and operational information technology infrastructure have been facilitated by employing IS projects (Pellegrinelli, 1997). Especially in the case of the public sector, IS and relevant technologies have become key elements in

delivering and managing more efficient public services (Currie, 2012; King and Crewe, 2013). In the case of the UK National Health Service IT programme, for instance, IS end users' (e.g. UK citizens, hospitals and system managers) level of expectation for services has increased, and they tend to take part in information systems and services with greater interest in health management (Mark, 2007).

In this regard, many researchers have examined the IS project in the public sector from multiple perspectives, including organisations, strategies and politics. Newman and Robey (1992) see IS development as a social process and develop a process model of user-analyst relationships in the social dynamics of system development. Currie (2012) interprets the National Programme for Information Technology in the NHS (NPfIT) by applying institutional isomorphism theory.

Despite recognition of the influence of organisational aspects in the context of IS projects, managerial difficulties and uncertainties have escalated. Characteristics of the IS environment have led to difficulties in developing and managing these projects. For example, Davies and Hobday (2005) emphasise the complexity of IS projects by developing the concept of complex products and systems. Those difficulties can easily be observed by analysing the case of NPfIT, which was considered as the largest and most controversial IT project in the world at the time (Currie, 2012). In order to understand these problems more structurally, Leavitt (1964) suggests a socio-technical change model to identify relationships amongst structure, people, technology and task and their effects on IS projects. Lyytinen and Newman (2008) re-interpret the model by emphasising the gap between organisational structure and technology; Figure 3-2 outlines Lyytinen and Newman's model. Consequently, it is essential to recognise and understand the impacts of IS on various elements, including organisational elements. In the same manner, this thesis echoes that the key issues in IS projects are not technology aspects but organisational aspects to overcome the complexity and uncertainty of managing IS projects (Doherty *et al.*, 2003; Ward and Daniel, 2012).

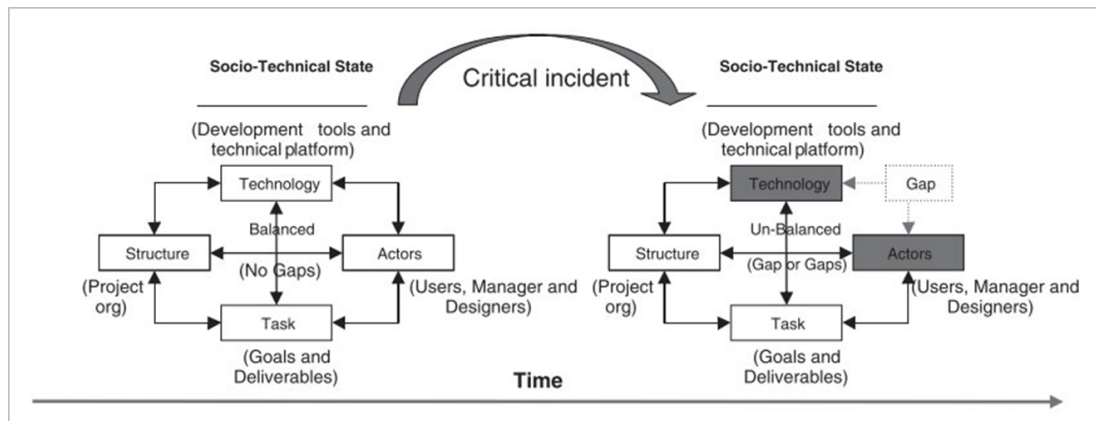


Figure 3-2: An event model for the socio-technical model (Lyytinen and Newman, 2008)

3.3 Information Systems Change and Benefits Realisation Management

3.3.1 Benefits and Benefits Management: Definition

The term benefits management was first mentioned in the late 1980s (Farbey *et al.*, 1999). Scholars have expressed increasing concern that the expected benefits from information systems implementation are challengeable despite the large amounts of investment in business change (Ward *et al.*, 1996; Bradley, 2010; Ward and Daniel, 2012; Breese *et al.*, 2015).

As a business term, benefits management is defined in a process perspective as “the process of organising and managing such that the potential benefits arising from the use of IS/IT are actually realized” (Ward and Elvin, 1999; Ward and Daniel, 2012, p. 8). Similarly, the Cabinet Office (2011b) defines the concept of benefits as “the measurable improvement resulting from an outcome perceived as an advantage by one or more stakeholders, and which contributes towards one or more organisational objectives” (Cabinet Office, 2011b, p. 75). In this context, the Cabinet Office conceptualises benefits management by providing five major activities to realise business benefits beyond a programme: ‘alignment of benefits with corporate objectives’, ‘benefits categorisation’, ‘benefits management cycle’, ‘optimise and look for other benefits’ and ‘benefits management within the transformational flow’. Thus, benefits management is defined as “the identification, definition, tracking, realisation and optimisation of benefits within and beyond a programme” (Cabinet Office, 2011b, p. 283). As a part of programme management, the key features and

major activities of benefits management are explained as in the list below. Based on the clear definition in a strategic context, the critical relationship between programme and benefits management is specifically identified. However, the context of benefits and benefits management is constructed only at a programme management level. This theoretical approach cannot be widely applied, and it can be limited in certain circumstances. For example, if an organisation has a single project, operational benefits of the project do not apply within the context of the Cabinet Office's principle.

3.3.2 Benefits Management Principle and Life Cycle

The OGC (2009) publishes *Managing successful programmes* to help readers understand the context of programme management as a best management practice guideline. In the diverse management agenda (e.g. identifying, defining, delivering and closing programmes), realising the benefits is considered the essence of programme management. "Benefits realisation is what the programme is all about. The purpose of the realising the benefits process is to manage the benefits from their initial identification to their successful realisation" (OGC, 2009, p. 219). In the OGC's (2009) book, benefits realisation is explained as the key activity to ensure operational stability and performance of operational activities within the perspective of programme management. However, one can criticise that the OGC defines benefits realisation within the context of programme management only. In other words, the OGC focusses on business strategies and organisational change management, apart from the benefits of each project. Of course, the recommended benefits realisation activities come within the category of benefits-related aspects. Nonetheless, the point of view is still focussed on the programme management level, and it has a limited view on dealing with benefits from a project. Furthermore, the benefits realisation activities are presented at a very high-level view due to the context of the widely used principle. Table 3-2 summarises the principle of benefits realisation provided by the OGC's benefits management framework. It includes three distinct sets of activities, input/output data, key roles and principle controls of programme benefits realisation.

Table 3-2: OGC's benefits realisation principle (OGC, 2009)

Category	Description
Activity	<ul style="list-style-type: none"> • Manage pre-transition • Manage transition • Manage post-transition
Input	<ul style="list-style-type: none"> • Management baseline information • Boundary baseline information • Governance baseline information • Outputs from 'delivering the capability'
Output	<ul style="list-style-type: none"> • Management baseline updated • Transition prepared and completed • Benefit measurement and reports • Business performance reports • Benefits reviews • New operations stabilized • Outcomes achieved • Legacy working practices and systems removed
Key roles	<ul style="list-style-type: none"> • Senior responsible owner • Programme board • Programme manager • Business change manager • Programme office • Business change team
Principle controls	<ul style="list-style-type: none"> • Programme board monitoring • Benefits realization profiles and plan forecasts • Assurance and audit reviews • Business performance monitoring • Dependency management

Ward and Daniel (2012) identify the benefits management process with a set of main stages and activities to “improve the identification of achievable benefits and to ensure that decisions and actions taken over the life of the investment lead to realizing all the feasible benefits” (p. 80). From the identification of benefits to establishing potential for further benefits, the authors define five stages and relevant activities such as what to analyse and how to manage benefits. The authors provide the organised processes and activities, but the context of benefits is explained based on IT investment without the recognition of its implementation. Table 3-3 summarises the five stages and key activities in the benefits management process.

Table 3-3: Stages and activities in the benefits management process (Ward and Daniel, 2012)

Stage	Activities
1. Identifying and structuring the benefits	<ul style="list-style-type: none"> • Analyse the drivers to determine the investment objectives • Identify the benefits that will result by achieving the objectives and how they will be measured • Establish ownership of the benefits • Identify the changes required and stakeholder implications • Produce first-cut business case
2. Planning benefits realisation	<ul style="list-style-type: none"> • Finalise measurements of benefits and changes • Obtain agreement of all stakeholders to responsibilities and accountabilities • Produce benefits plan and investment case
3. Executing the benefits plan	<ul style="list-style-type: none"> • Manage the change programmes • Review progress against the benefits plan
4. Reviewing and evaluating the results	<ul style="list-style-type: none"> • Formally assess the benefits achieved or otherwise • Initiate action to gain outstanding benefits where feasible • Identify lessons for other projects
5. Establishing potential for further benefits	<ul style="list-style-type: none"> • Identify additional improvements through business changes and initiate action • Identify additional benefits from further IT investment

At a programme management level, the Cabinet Office (2011b) defines a generic four-step cycle for managing benefits on any programme: identify, plan, deliver and review. The identification step aims to identify likely benefits from programme outputs by covering corporate objectives. The second step, planning, is intended to understand how the identified initial benefits fit together by considering short-term and long-term benefits. The third step is principally linked to three benefits realisation stages: pre-transition, transition and post-transition. Thus, benefits delivery is related to a focus on business flows across programme outputs, outcomes and benefits. A review stage, the last step, covers the benefits optimisation process to increase the feasibility of benefits realisation and management. The above stages, however, do not consider benefits realisation at a project management level, as discussed in section 3.3.1, Benefits and Benefits Management: Definition. Most studies consider benefits management activities as part of programme management, not part of project management. For example, the limited approach of PMI's PMBoK

model can be discussed. In the context of the PMBoK model, project management is regarded as the activities related to delivering project outputs only. Then, benefits realisation is excluded from the boundary of project management activities. In other words, the approach can be interpreted as not considering the fundamental source of benefits (IS implementation) through the benefits management process (IS benefits realisation). By criticising the limitation of the approach, this thesis argues that a need exists for continuity between the IS implementation stage and the IS benefits realisation stage.

3.3.3 Project Benefits and Values

As a synonym for benefits, a value that has a meaning similar to benefits is defined as the “quotient of function/cost or quality/cost, performance/resources or similar” (Morris, 2013, p. 83). Thus, value and value management embrace the financial aspect along with the context of benefits (Laursen and Svejvig, 2016). In order to clarify the conceptual meaning of benefits and value, Morris (2013) explains both concepts within a project management viewpoint. The author argues that benefits management focusses on why the project or programme is undertaken, whereas value management is evaluated by functional performance and input cost (e.g. $\text{Value} = \text{Benefits} / \text{Input Cost}$). Thus, one can see that the concept of benefits captures something broader which is not always easily financialised. By analysing the key principles of the two concepts (Table 3-4), he points out issues in current project management studies that can be improved further. First, the PMI’s PMBoK model, often regarded as the project management bible, does not cover both value and benefits management issues. As the principles of PMBoK model are based on project execution, it does not focus on post-implementation benefits or further value. Second, the author disagrees with the viewpoint of PMI’s approach to explaining the benefits concept in project and programme management. PMI’s PMBoK covers the benefits issue only in programme management (not in project management). Recently, PMI has paid attention to the importance of project benefits management (PMI, 2016a, 2016b, 2016c, 2016d). Though the PMI’s benefits realisation framework classifies the roles of executive sponsor, benefits owner and project manager, the point of view is still weighted towards temporary project organisations without a clear distinction

between a supplier and an owner organisation (PMI, 2016c). For example, a project owner’s unique responsibilities are less emphasised - “benefits management is a shared responsibility between executives and project teams, and both project team and project manager are one of a benefits driver” (PMI, 2016d).

In this context, Morris (2013) provides his own perspective that benefits management is related to the realisation of benefits during project and programme implementation and also in operations. Though he focusses on the value of project management office (PMO) training rather than a project owner’s perspective, he recognises the importance of benefits management from a project execution stage. PMI’s standard guideline on programme management and Morris’ counter-argument are as follows:

“According to PMI’s standard on Program Management (PMI, 2006, p. 4), ‘some organisations refer to large projects as programs. The management of large individual projects or a large project that is broken into more easily managed subprojects remains with this discipline of project management ... If a large project is split into multiple related projects with explicit management of the benefits, then the effort becomes a program.’ What about projects that aren’t split into multiple projects? And shouldn’t all projects, and their subprojects, pay explicit attention to managing the benefits they are supposed to be delivering?”

(Morris, 2013, p. 190)

Table 3-4: Key principles of benefits and value (Morris, 2013)

Benefits	Value
<ul style="list-style-type: none"> • Having effective processes, organisation and techniques for benefits planning, management and harvesting • Developing a benefits management plan/strategy • Identifying and structuring benefits and relevant performance measures (business, technology, organisation, people and processes) 	<ul style="list-style-type: none"> • A multidisciplinary approach to analysing value ‘in terms of stakeholders’ needs and objectives’ • A structured decision process to stimulate creative thinking • A focus on analysing functions rather than just accepting predefined solutions

-
- Implementing a system to track and act on benefits as they are realised, optimising the mix of benefits and identifying additional opportunities
 - Aligning risk and changing management practices so that benefits (opportunities) are given proper review
-

Within the context of project management, Zwikael and Smyrk (2012, p. 11) define project benefits as “the flows of value that arise from a project”. In terms of benefits and values, Bradley (2010) categorises the types of value by intangible and tangible and re-categorises the tangible value into three: definite, expected and anticipated. Intangible benefits refer to anticipated values that are difficult to substantiate. Definite tangible values refer to predicted values with certainty. Expected tangible values are the benefits expected based on historical trends with a certain level of certainty, and anticipated tangible benefits involve anticipated benefits with unreliable and unpredictable values.

There has been continual research attention on how the benefits of IS and relevant IT value creation in the public/private sectors are realised (Shang and Seddon, 2002; Bartlett, 2006; Ward *et al.*, 2008; Seddon *et al.*, 2010; Doherty *et al.*, 2012; Wilkin *et al.*, 2013; Pan *et al.*, 2015). Pang *et al.* (2014a) analyse IT value creation in the public sector within a resource-based view. In the authors’ framework, five key IT resources are selected to play a crucial role in shaping organisational capabilities in the public sector; see details in Table 3-5. Similarly, Wilkin *et al.* (2013) focus on value creation in IS deployment, which is derived from IT governance performance. Pang *et al.* (2014b) examine the administrative efficiency of the US government by investigating cost efficiency between IT spending and profits.

Table 3-5: Theoretical framework for IT value in the public sector (Pang *et al.*, 2014a)

Information Technology Resources	Organisational Capabilities
<ul style="list-style-type: none"> • Digitized administrative processes • Public intelligence analytics 	<ul style="list-style-type: none"> • Public service delivery capability • Public engagement capability

• Inter-organizational system integration	• Co-production capability
• Online public interactive interfaces	• Resource acquisition capability
	• Public sector innovation capability

3.3.4 Delivering Benefits from Information Systems Project

The project management literature has attempted to discuss the concept of benefits as a value with the introduction of project, programme and portfolio management at an organisational level (OGC, 2009). However, it is clear that there has been a poor understanding of benefits realisation and management within the context of project management (Bartlett, 2006; Melton *et al.*, 2011; Ward and Daniel, 2012; Badewi, 2016). It is generally acknowledged that managing benefits from IS and technology is regarded as a part of business planning processes without the recognition of its implementation phase during the project (Bartlett, 2006). A few studies have made an attempt to interpret benefits management within the project management context. For example, Ward and Daniel (2012) broadly explain benefits management as a way of increasing business value of information technology projects. Melton *et al.* (2011) discuss benefits management within the context of the project management life cycle. Badewi (2016) develops a project benefits governance framework to analyse the impact of project management and benefits management practices on project success. This is followed by the key context of the three studies.

Ward and Daniel (2012) compare benefits management with traditional IS project approaches at a more general level. The authors emphasise that the IS project is not about technology delivery but benefits delivery to maximise value-for-money. The context of this comparison is consistent with Nelson's (2005) findings. In Nelson's (2005) paper, senior managers in IS projects judge the success of a project as value delivered to the organization, whilst project managers put delivery on time, cost and quality above value. In other words, the traditional approach of project management has a limitation of covering benefits from IS. Table 3-6 summarises the comparison.

Table 3-6: Comparison of benefits management with traditional information systems project approaches (Ward and Daniel, 2012)

From (IS Project Management)	To (IS Benefits Management)
<ul style="list-style-type: none"> • Technology delivery • Value for MONEY • Expenditure proposal • IT implementation plan • Business manager as onlooker/victim • Large set of unfocussed functionality • Stakeholders ‘subjected to’ • Trained in technology • Technology and project audits 	<ul style="list-style-type: none"> • Benefits delivery • VALUE for money • Business case • Change management plan • Business manager involved and in control • IT investment sufficient to do the job • Stakeholders ‘involved in’ • Educated in exploitation of technology • Benefits review

In addition to Ward and Daniel’s approach, Melton *et al.* (2011) emphasise the significance of benefits management and highlight the need for project benefits management by linking projects to the business from the perspective of the project life cycle. The authors provide four value-added project stages by expanding the conventional project management life cycle: business case development, project delivery planning, project delivery and benefits delivery (Melton, 2007). Thus, the first stage (business case development) and the final one (benefits delivery) are added before and after a project’s close-out to integrate the project into the business.

On the basis of the four-stage project life cycle, Melton *et al.* (2011) specify the concept of linking project delivery to business benefits. Table 3-7 summarises the authors’ conceptual work on the benefits management process (benefits concept, benefits specification and benefits realisation). It is useful to understand the importance of benefits realisation and management, but only tools and techniques find a heavy focus apart from an organisational context and considerations. In other words, covering the concept of the project-business linkage for realising benefits, their work emphasises the significance of the preparation of benefits delivery from the project stage. However, the value-added model puts more weight on the use of a toolkit without the recognition of organisational context, as the benefits management model is developed for wide use.

Table 3-7: Benefits management concepts and tools (Melton *et al.*, 2011, p. 18)

Benefits -	Concept	Specification	Realisation
Concepts	<ul style="list-style-type: none"> • Development of benefits criteria • Benefits, issues and activity mapping • Benefits measurement and scoring • Stakeholder management 	<ul style="list-style-type: none"> • Scope definition • Hierarchy of objectives • Criteria to quality criteria • Resistance to change • Business case development cycle • Lean thinking and lean value management • Cost/Benefit analysis 	<ul style="list-style-type: none"> • Delivery of explicit and implicit benefits • Benefits risk assessment • Benefits tracking and cumulative scoring • Customer contracts and Kano analysis • Disengagement and project closure • Sustainability
Tools	<ul style="list-style-type: none"> • Benefits mapping tool • Benefits matrix • Benefits scoring tool 	<ul style="list-style-type: none"> • Scope definition tool • Scope challenge checklist • Business environment checklist • Benefits influence matrix • Business case template 	<ul style="list-style-type: none"> • Benefits realisation risk tool • Customer satisfaction analysis tool • Business satisfaction analysis tool
Reference Tools (Melton, 2007)	<ul style="list-style-type: none"> • ‘Why?’ checklist • Simple benefits hierarchy tool 	<ul style="list-style-type: none"> • ‘How?’ checklist • Road map decision matrix • Benefits specification table • Business case tool 	<ul style="list-style-type: none"> • ‘Benefits realised?’ checklist • Benefits tracking tool • Sustainability checklist • Benefits realisation planning tool

Badewi (2016) examines whether project management practices and benefits management practices enhance the probability of success if they come together, based on the project benefits governance framework. To explain the significance of

benefits realisation from projects, the programmification of the concept of project management is emphasised for organisations to achieve the expected benefits (Maylor *et al.*, 2006) - as the benefits management topic has been continuously considered as the boundary of programme management. As seen in Figure 3-3, the framework explains that the authority and responsibility of a benefits owner has wider managerial coverage than those of the project manager. In regard to the contextual synchronisation between project and benefits management, Badewi suggests “Blueprint design and project dossier” can enhance the connectivity between the two areas of management that have different business objectives. By distinguishing the managerial role of projects and benefits, the author highlights differentiated duties of the project manager and benefits owner. In addition to the traditional project management life cycle, the benefits management life cycle is added, including benefits identification/planning/implementation/audit and business case development. Thus, one can conclude that a project owner should consider benefits management issues such as benefits identification, planning and implementation before/after the project as well as during the project.

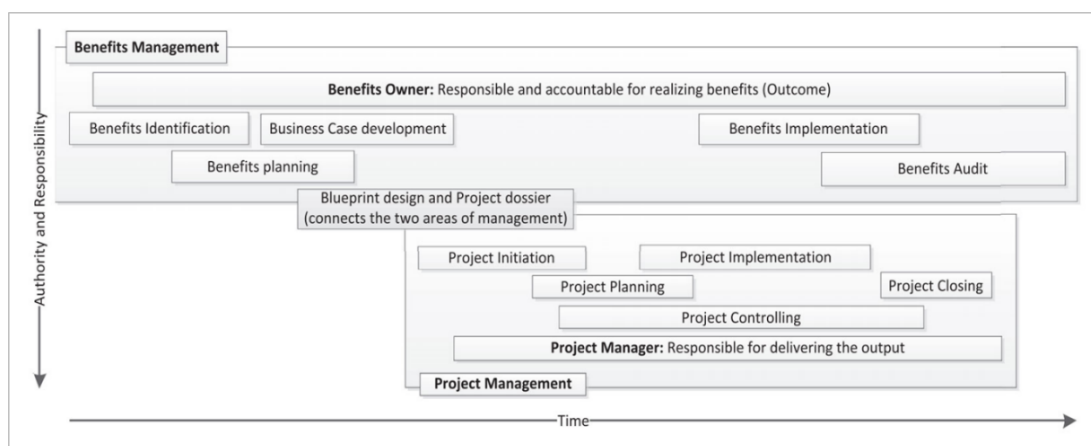


Figure 3-3: Relationship between project management and benefits management under project benefits framework (Badewi, 2016)

The benefits management literature has given its research attention to the importance of benefits realisation from IS projects. However, Doherty *et al.* (2012) point out that beneficial returns and desired effects from investments in IS projects have still been disappointing. The authors argue that the success of IS projects should be evaluated in terms of delivering expected benefits rather than delivering a technical artefact. To

address the problematic situation, Doherty *et al.* (2012) examine the factors affecting the successful realisation of benefits from IS projects. Systems development practices and benefits issues from three organisations (strategic health authority, university and city council) are explored, and only one organisation is considered successful in its adoption of a benefits realisation perspective. The findings from the study highlight a set of principles for IS benefits realisation. By comparing traditional project success factors to benefits realisation factors, a coherent set of IS benefits realisation factors is developed. For example, the authors argue that detailed benefits planning activities (for benefits realisation) are additionally required with identifying goals and objectives (for project execution). The finding makes an original contribution in that it highlights the importance of benefits realisation beyond the successful delivery of an IS artefact. Moreover, the project success is redefined within the perspective of a project owner's IS benefits. In this regard, the context of revealed results can be enhanced more if the perspective of each factor is clarified. For instance, all of the suggested benefits realisation factors are required aspects for a project owner. In contrast, the comparison factors (traditional project success factors) are a mixture of a project supplier and owner's commitment. Table 3-8 summarises the comparative perspectives between traditional project success factors and benefits realisation factors.

Table 3-8: Benefits realisation factors in systems development projects (Doherty *et al.*, 2012)

Traditional Project Success Factors	Benefits Realisation Factors
Identifying goals and objectives	Detailed benefits planning
Project management	Management of transformation
Well-balanced project teams	Coherent governance structures
Senior management support	Commitment to active business leadership
User participation	Stakeholder-enabled benefits realisation
Rigorous software testing	On-going benefits review

Summing up, IS implementation has been planned and developed as a form of project or programme. However, recent research approaches to IS projects and benefits have a few problematic issues. For example, the theoretical distinction between project benefits and operational benefits is ambiguous or gets lost in the mix.

Otherwise, a few scholars have a dichotomous research approach to dealing with project management and benefits realisation; most IS project studies have focussed on how a project can be executed, and IS benefits studies focus on financialised values from IS investment. Through the literature review, this research explains the reasons for the issues as follows. Most studies with respect to benefits realisation management have been carried out without recognising the importance of business continuity through an IS development project period (Melton *et al.*, 2011; Breese *et al.*, 2015; Badewi, 2016; Zwikaël, 2016). In addition, intangible aspects and non-financialised values such as organisational and governance factors have been insufficiently considered. In other words, IS projects and benefits realisation should be considered within a wider organisational context, and a project owner needs to have full operational ownership and accountability (Coombs *et al.*, 2001; Doherty *et al.*, 2003). Not only project benefits but also post-implementation benefits after IS deployment need to be considered.

3.4 Gap Identification and Summary

This chapter reviewed the key managerial issues of IS project and benefits management. First, the features of an IS project and its life cycle models were explained to identify the root of benefits from IS. After that, the organisational uncertainty and changeability of IS were outlined. Second, benefits realisation and management were defined. Then the project management literature that covers the issues of IS benefits/values was reviewed to investigate the relationship between project management and benefits management.

A few limitations of the study include that the research gaps for this thesis are identified from the literature. Due to the uncertainty and changeability of IS, realising benefits is still challenging in most organisations. In the academic field, little empirical evidence shows how IS benefits can be realised and why the difficulties of benefits management still occur. For example, most traditional project management life cycle models have not covered IS benefits identification (before a project) or realisation (after a project). Normally, business change cannot be accomplished solely during a project life cycle, and a successful project itself cannot guarantee business benefits (Zwikaël and Smyrk, 2012; Breese *et al.*, 2015).

Improved business processes can only be stabilised through the operation of a new system after the project. In other words, project management and its capabilities must be considered within a wider approach (business continuity from the project stage to the next-operation stage) in order to deliver planned project benefits to operations.

Drawing on the literature review (chapters 2 and 3), this thesis suggests that project capabilities to deliver operational benefits from IS projects are a project owner's critical objective. In addition, the study emphasises that the benefits-related project capabilities have a contextual similarity with the concept of dynamic capabilities: a project owner needs to facilitate dynamic capabilities to deal with IS benefits realisation through continual IS project execution and IS change. Thus, both the context of dynamic capability and the IS project owner's capability are theoretically related to maximising operational performance during business (IS) change and continual project environment. In order to specify the research context in the case of a public IS project, the next chapter will review the literature related to public organisations and their IS projects, particularly focussing on the UK public sector.

CHAPTER 4. PUBLIC INFORMATION SYSTEMS PROJECTS IN THE UK

4.1 Chapter Overview

This chapter, the last part of the literature review, will examine the key features of public sector organisations, projects and information systems, especially in the UK public sector. The first section will outline the general nature of public sector organisations and their business ecosystem. As few key features of public sector business have been identified in comparison with the private sector, those differences need to be understood. The characteristics of the public sector and their impacts on public projects will be reviewed. Then the characteristics of IS and technology in government organisations will be covered.

Second, the major issues of IS in the UK central government will be described with a summary of public IS initiatives and outcomes. Recently, the UK government has published reports covering its project information and relevant policies. By reviewing those reports, the UK government's major IS project portfolio and IS initiatives are identified. In addition to the review, the theoretical knowledge about PRINCE2 project methodology is also studied. The PRINCE2 model is a project management methodology developed by a group of UK project experts and government bodies which is frequently utilised in UK projects. The theoretical principles and advantages/disadvantages of PRINCE2 model will be summarised.

Similar to the other literature review chapters, the last section will identify the research gap identified from the literature review. Before moving on to the next chapter covering the explanation of applied research methodology, an overall summary of the literature review (chapters 2, 3 and 4) will be provided with the research questions for this study.

4.2 Public Information Systems

4.2.1 Public Sector Project and Business

Public sector activities have clear differences when compared with private sector businesses (Borins, 2001; Ridder *et al.*, 2005; Piening, 2013). There are even differences amongst public organisations (Wirick, 2011); for instance, who is the end user of a public service (e.g. citizens, other public agencies)? Are public

organisations operating on a self-supporting basis (e.g. water, wastewater, sewer) or a quasi-public basis (e.g. state-supported universities)? To clarify the distinguishing characteristics of the public sector, identifying the purpose of public organisations and their services is necessary.

There is no doubt that most public sector organisations operate to serve larger groups of people and organisations, including citizens and government agencies. This means that establishing the objectives of public services and projects is complex, and their managerial issues are diverse (Heeks and Bhatnagar, 1999). In terms of performance evaluation, public businesses generally focus on organisational performance and satisfying reporting requirements, whilst the for-profit strategy is the main approach in the private sector (Collins, 2005; Grimsley and Meehan, 2007; Wirick, 2011; Piening, 2013). “Public sector agencies lack the simple measures of performance, like return on investment (ROI), that private sector organisations enjoy” (Wirick, 2011, p. 3).

In addition, the opportunities to access external resources are more limited than in a private business environment, and this leads public organisations to concentrate more on internal resources and potential areas of expertise (Dalton, 2007; Pablo *et al.*, 2007). In other words, internally focussed resources and related organisational performance are the key success factors in projects in the public sector. From an opposite viewpoint, collaboration with private sector organisations such as public private partnerships (PPPs) can also help public organisations improve their public services.

Furthermore, public projects are closely related to government policy and funding, and government strategies are the triggers for generating projects and their strategic change. In this regard, public sector business has a higher level of changeability due to the change of policy and the imposition of short-term election cycles (Boyne, 2002; Piening, 2013); that is, the election cycle of the government of England has been about four years on average, although a new fixed term of five years was introduced recently.

In regard to these issues, Wirick (2011) provides major official constraints of US public sector projects, including statute, law, rules and constitution. Table 4-1 summarises the formal constraints, sources and examples. On the basis of key

features and distinctive issues of public sector business, the strategic direction of these entities can be understood as follows. It is acknowledged that most public organisations tend to concentrate on project procurement management due to the lack of internal development capacities; this is similar to the majority of small and medium-sized enterprise private businesses. Moreover, if financial capacities are also limited as most public organisations are, they have no choice but to lean on external service providers to acquire cost-efficient resources and capabilities. Thus, public organisations must focus not only on contract or procurement management capabilities but also on internal capability development to deal with business changes.

Table 4-1: Official constraints of public sector projects (Wirick, 2011)

Formal Constraint	Source	Example
Constitution (or city chapter)	Derived directly from the consent of the people under the authority of their sovereign capacity	The Constitution of the United States, including amendments made to it since its adoption in 1787
Statute or law	Created by those elected by the people to act on their behalf	The Freedom of Information Act, which makes public records accessible to the public with certain restrictions
Executive order	Issued by the executive based on either constitutional powers prescribed to the executive or laws passed by the legislature	Executive Order: Facilitation of Presidential Transition, issued October 2009 to describe the roles of persons charged by the president to assist in the transition to the new administration
Administrative rule	Issued by public agencies in order to implement statutes	Use of electronic signatures and records, Office of Information Technology, which prescribes the use of electronic signatures and transactions by state agencies
Mandatory process or procedure	Issued by agencies	Agency policy prohibiting the use of e-mail by employees for private purposes

4.2.2 Information Systems Project and Outsourcing in the Public Sector

Information systems and technologies have played an increasingly central role in the workings of government bodies (NAO, 2011a). However, successive governments' lack of in-house capacity in systems development and management has led to repetitive cost-wasting IS projects. The issue is that the learning curve of government bodies has never been positive and has still decreased through making the same mistakes (King and Crewe, 2013). Thus, we need to recognise that IS in the public sector, such as e-government systems, differs from commercial IS in the private sector (Ravishankar, 2013). Although both arrangements focus on their own strategic goals, public IS encompasses more complex strategic objectives beyond financial benefits, including social inclusion, community well-being and sustainability (Heeks and Bhatnagar, 1999; Grimsley and Meehan, 2007). Wilkin *et al.* (2013) describe systemic differences between the public and private sector regarding information technology initiatives by analysing the corporate governance of IT standards and a major Australian public sector organisation. In order to explain the distinction between the two, the authors claim five significant issues for information technology and key characteristics of the two sectors: complexity, initiatives, culture, learning and experience and risk. Table 4-2 summarises the systemic differences. As seen in the table, the differentiated characteristics of public information systems require government organisations to have a differentiated management approach.

Table 4-2: Differences in information systems between the public and private sectors (Wilkin *et al.*, 2013)

Significant Issues for IT Initiatives	Characteristic Focus in the Public Sector	Characteristic Focus in the Private Sector
Complexity	4+ dimensional world (government, citizens, political imperatives and the media). Increasing demand for 'joined up' projects and key services delivered sometimes through intermediaries.	3-dimensional world (shareholders, the organisation and regulatory bodies). Projects require consistent IT infrastructure but generally the scope of access is more restricted.
Initiatives	Emphasis on announcements	Market responses drive value:

	and initiatives can proliferate with little or no integration and prioritisation.	related to integration and prioritisation of initiatives, that is, strategic planning.
Culture	‘Make decisions correctly’ vs ‘make the right decisions’.	Focus on decision-making related to strategic not political planning.
Learning from experience	Weak institutionalised learning with ill-defined accountabilities.	Financial accountability and demands of regulatory compliance encourage organisational learning.
Risk	Propensity to focus on managing political risk rather than operational and financial risk.	Focus on operational and financial risk.

A form of IS project has also become an inevitable approach for government bodies to achieve their distinctive goals. Information systems projects and relevant innovations in the public sector, however, still have underperformed due to complexities and strategic ambiguities (El-Haddadeh *et al.*, 2013; Ravishankar, 2013; Sandeep and Ravishankar, 2014). Data from several sources have identified the failure factors and issues in public IS disasters (Caudle *et al.*, 1991; Gauld, 2007; Goldfinch, 2007; King and Crewe, 2013; Galliers and Leidner, 2014). For example, Heeks and Bhatnagar (1999) reveal 10 critical failure factors in public IS, as seen in Table 4-3. On the basis of case examples of reform success and failure, the authors identify critical success and failure factors in IS projects. By analysing real-world examples, they argue that failure is far more prevalent than success and emphasise the significance of identifying critical failure factors. Amongst these factors, cultural issues are seen as a unique variable in public IS projects (Goldfinch, 2007).

Table 4-3: Critical failure factors in public information systems disasters (Heeks and Bhatnagar, 1999)

Factor	Description
Information	Information and data inadequacies
Technical	Problems with IT such as incompatibility across agencies
People	Lack of staff with sufficient training, skills or inclination to handle or develop IT
Management	Lack of management skills, knowledge and training
Process	Processes are inadequate to integrate community or channel

	relevant information
Cultural	Clashes with national/local culture
Structural	Information systems clashes with organizational and/or management structures
Strategic	Information systems not coordinated across different agencies or divisions
Political	Political infighting derails project
Environmental	Factors outside the organization disrupt project

In order to deal with the difficulties in managing public IS projects as explained in the previous section, public organisations have tried to overcome the capability gap in various ways. One of them is an IS outsourcing strategy for minimising a lack their internal IS capacities. Outsourcing is an abbreviation for ‘outside resource using’ (Quinn and Hilmer, 1994). Amongst the diverse definition, Kern and Willcocks (2002) define outsourcing as “a process whereby an organization decides to contract out or sell its assets, people and/or activities to a third party supplier, who in exchange provides and manages these assets and services for an agreed fee over an agreed time period” (Kern and Willcocks, 2002, p. 3). Thus, outsourcing refers to contracting activities with outside parties to implement and maintain services.

Public sector organisations have experienced the proliferation of IS outsourcing over a few decades, by virtue of its high velocity of change and the need for enhancing public values (Currie, 1996; Burnes and Anastasiadis, 2003; Cordella and Bonina, 2012; Bukh *et al.*, 2014). Hence, managing and facilitating capabilities that are fit-for-purpose has become a key factor for realising benefits from the outsourced IS (Feeny and Willcocks, 1998; Lacity and Willcocks, 2001; Ranganathan and Balaji, 2007; Han *et al.*, 2008; Cordella and Willcocks, 2012; Oshri *et al.*, 2015). Researchers have agreed that the effective complementarity between client and vendor IT capabilities significantly influences outsourcing success (Plugge *et al.*, 2008; Oshri and Kotlarsky, 2009; Han *et al.*, 2013; Su and Mao, 2013). For example, Alanne and Pekkola (2015) point out that knowledge transfer amongst IS organisation units can create the managerial efficiency of outsourced IS development project. By providing knowledge transfer challenges such as knowledge, vendor, offshoring and communication related issues, the authors try to emphasise the importance of organisational networks and collaboration.

A number of outsourcing studies, however, have a greater focus on the capabilities in the private sector or on the IS supplier's capabilities (Han *et al.*, 2008; Lacity *et al.*, 2009). A few studies have also given their attention to the contractual roles of clients with regard to commercial management capabilities such as contractual/relationship management and vendor selection strategy (Hislop, 2002; Chakrabarty *et al.*, 2008; Swar *et al.*, 2012; Oshri *et al.*, 2015), yet little progress has been made in our understanding of distinctive capabilities for an owner, who is the de facto investor and operator of IS and business benefits (Aritua *et al.*, 2009; NAO, 2009a; Lacity *et al.*, 2010; NAO, 2016; Winch and Leiringer, 2016).

4.3 Information Systems Delivery in the UK Public Sector

4.3.1 UK Government Major Projects Portfolio

Major projects have had a role in delivering efficiency in public services. Several major projects have been underway in the UK in the past decades, and others have been planned over the next 40 years (Major Projects Authority, 2014, 2015). Currently, the UK government's major projects portfolio covers a £489 billion investment in 188 major projects that will advance infrastructure and public services, including defence of the nation (Major Projects Authority, 2015). Thus, the significance of project capabilities in the UK is a matter of course, and the benefits from the projects are issues as critical as ever in the UK central government.

In order to support the procurement and acquisition process of UK government organisation, the Office of Government Commerce was established as part of the HM Treasury in 2000 (Cabinet Office, 2011a); the OGC was formerly the Central Computer and Telecommunications Agency (CCTA). From 2000 until June 2010, the OGC was the former owner of Best Management Practice as the custodian of the portfolio on behalf of the UK government, and its major role was to help the UK government deliver the best value in its investment and spending, e.g. Managing Successful Programmes (MSP), Projects in Controlled Environments (PRINCE2), Management of Risk (MoR), Portfolio Management (MoP), Value Management (MoV), Information Technology Infrastructure Library (ITIL) and Portfolio, Programme and Project Offices (P3O). The OGC usually operated the UK

government's procurement services and acted as a facilitator for best practices for projects and programmes in the UK public sector. After that, the managerial and functional roles of OGC were moved to the Cabinet Office as part of the Efficiency and Reform Group (ERG) in June 2011 due to the reorganisation of the UK government (Guardian, 2011). The ERG was formed in June 2010, and "it integrates IS as an enabler of efficient delivery, with commercial skills in procurement and project management from across government in the Cabinet Office" (NAO, 2011a, p. 23). For example, its main functions are supplier negotiations and managing commercial portfolios. At the same time, the roles of managing qualification and accreditation were managed by the APM Group. The Best Management Practice Portfolio was initially developed for the UK government, but the government has requested private partners for the accreditation duties for every four/five-year period. Later, AXELOS won the renewal contract, and the managerial roles (managing qualifications, methodologies and best practices) of the APM Group were transferred to AXELOS. The joint venture group AXELOS was set up by the UK government and Capita in 2014 (AXELOS, no date). Figure 4-1 summarises the structural relationship amongst those methodologies and best practices.

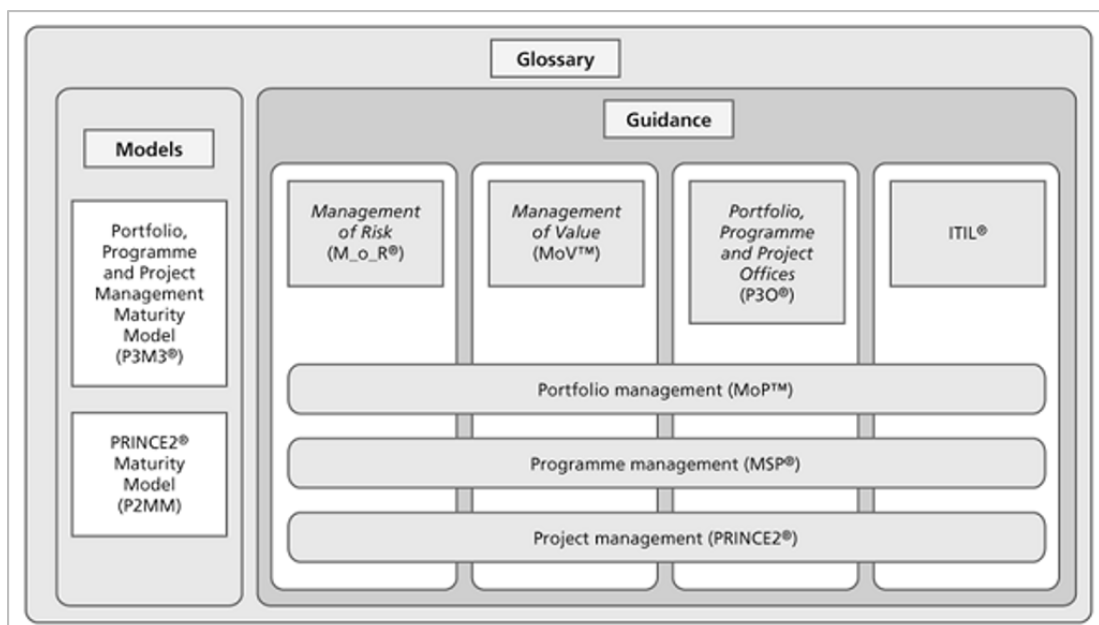


Figure 4-1: OGC best practice guidance (OGC, 2009)

The MSP was developed as a best practice guide for deriving successful projects and programmes in UK public organisations. According to a survey conducted in 2006,

more than 80% of centres of excellence (CoE) and senior responsible owners (SRO) have used the MSP principle. In particular, 94% of CoE and 73% of SRO agreed that the MSP is very/fairly helpful (NAO, 2006b). It is a programme management framework that contains principles and processes for carrying out programmes. The MSP defines programme management as “a temporary, flexible organization created to coordinate, direct and oversee the implementation of a set of related projects and activities in order to deliver outcomes and benefits related to the organization’s strategic objectives” (Cabinet Office, 2011b, p. 5). MSP transformational flow provides the life cycle of a programme from inception to the delivery of new capabilities and benefits (Cabinet Office, 2011b); see Figure 4-2. Thus, this model emphasises not only the programme life cycle itself but also how benefits are delivered, a key value of the UK government’s prime task.

In terms of using the OGC guidance in the UK public sector, one remarkable point is that approximately 90% of Centres of Excellence and 70% of Senior Responsible Owners found the guidance to be very helpful (NAO, 2006b); see Table 4-4. On the other hand, about 20% of Senior Responsible Owners mentioned they do not use any guidelines yet. This can be interpreted as the UK government project having a high level of dependence on OGC guidelines and principles.

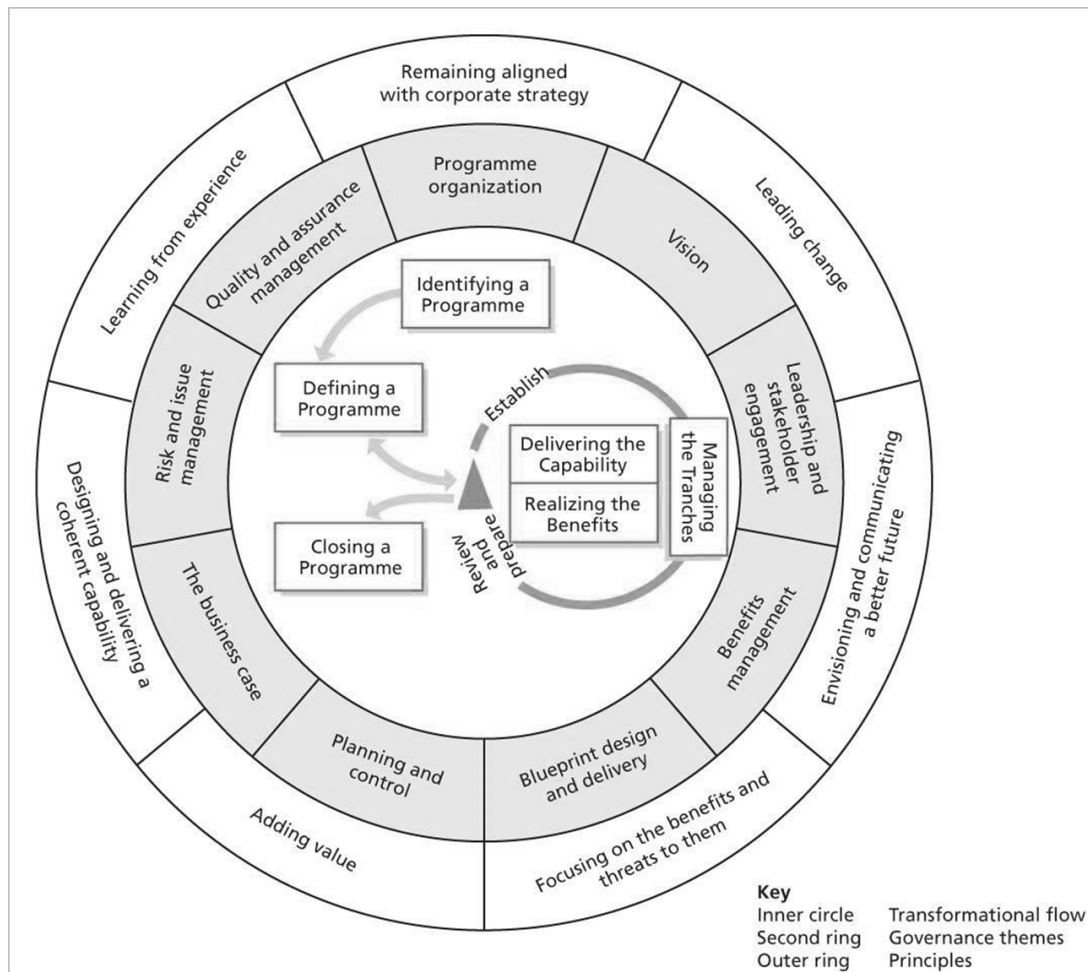


Figure 4-2: Transformational flow in managing successful programmes (OGC, 2015)

Table 4-4: Centres of excellence and senior responsible owners find OGC guidance helpful (NAO, 2006b)

OGC Guidance	CoE: Guidance 'very/fairly helpful'	SRO: Guidance 'very/fairly helpful'	SRO: Guidance 'not used'
Managing Successful Programmes	94%	73%	15%
PRINCE2	90%	70%	13%
Guidance on Management of Risk	90%	70%	15%
Successful Delivery Toolkit	87%	65%	23%

The Cabinet Office in the UK has published the Major Projects Authority Annual Report to share the initiatives, current issues and outcomes of government projects.

According to the assessment report published in 2014, more than 120 (more than 60%) of 199 projects were “feasible with significant issues”, “in doubt”, or “unachievable”, and those covered £274.6 billion (about 70%) of the total costs of £398.4 billion (Major Projects Authority, 2014). Table 4-5 summarises the current status of UK major projects, including the initiatives, costs and schedule for the most recent two years. Based on the data, one can clearly see that a form of project and its management performance have been a long-pending issue in the UK. Thus, managing projects and their performance (e.g. budget, cost and schedule management) has still been a significant on-going issue in the UK.

Table 4-5: UK government’s major projects in numbers in 2014 and 2015 (Major Projects Authority, 2014, 2015)

Description	2013-2014	2014-2015
Number of projects	199	188
Whole life cost	£488 Billion	£489 Billion
Budget	£19 Billion	£22 Billion
Scheduled to complete by September	28%	32%
Scheduled to complete in the 2020s or 2030s	24%	21%
Largest investments (military equipment, energy generation and efficiency and railway infrastructure)	65%	74%

4.3.2 Information Systems Project Initiatives in the UK Public Sector

The UK government’s dependence on information systems and technology has significantly accelerated during the last two decades (NAO, 2011a, 2013a). In very early times, only 600 large to medium-sized computers existed, and the “expenditure on the purchase/hire of computers in the Computer and Telecommunications Vote in 1982-83 was some £106 million” (NAO, 1984). In 2003, the Parliamentary Office of Science and Technology reported 100 major IS projects with a total value of £10 billion. After 10 years, 48 additional IS projects have been carried out, but they cover more than £28 billion (Major Projects Authority, 2015). Thus, the scale of IS and the value of each project have increased greatly. The key components of UK government information systems are shown in Figure 4-3.

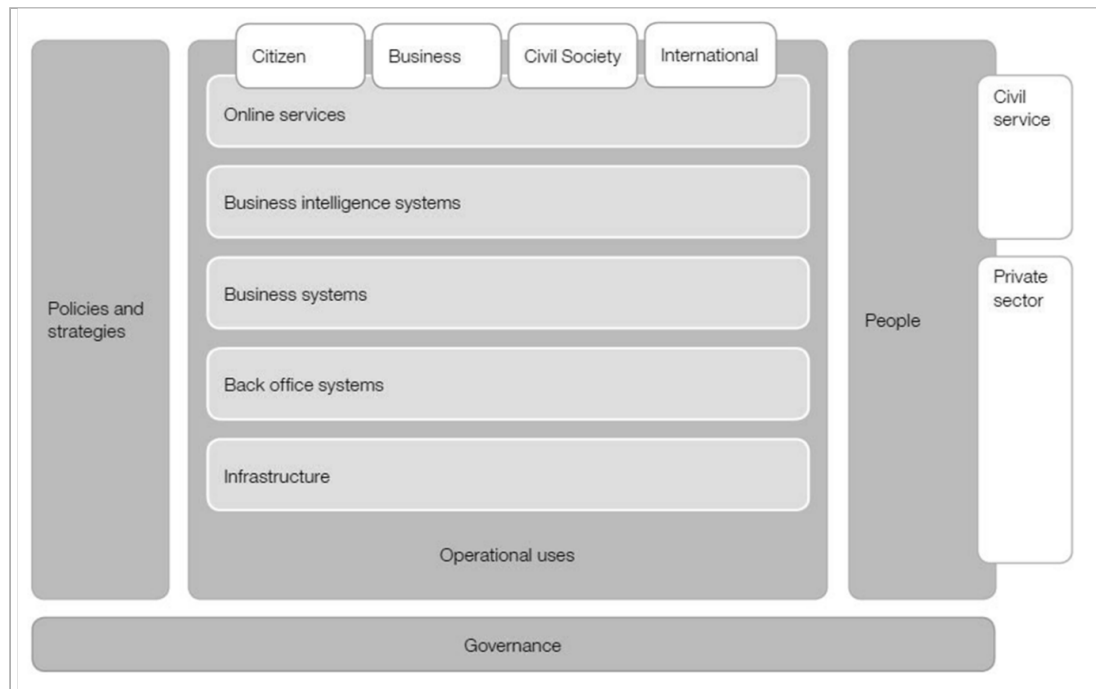


Figure 4-3: Key information systems components of UK government (NAO, 2011a)

The UK central government broadly categorises the type of projects in its portfolio into four. One category that encompasses information, communication and technology projects also has a direct influence on other three types: government transformation and service delivery, infrastructure and construction and defence equipment. The aim of projects is to develop new IS to reduce costs and provide better access to public services (OGC, 2011). Not only the development of information technologies but also increasing citizens' interest in how they can engage with government and public services online lead the advancement of IS in the UK. A recent government paper reports that £316 million were saved as a result of the implementation of IS in 2011-2012 (NAO, 2013c). Nevertheless, the failure of IS projects has been a much more common and on-going phenomenon in the UK. For example, the media have reported that the UK government's latest big IS projects have ended by being £350 million over-budget (Foxton, 2014). Though a number of studies has examined how this problem can be solved, they have reported that being over-budget and over-schedule in IS projects in the public sector is still increasing in number (Caudle *et al.*, 1991; Grimsley and Meehan, 2007; El-Haddadeh *et al.*, 2013; King and Crewe, 2013; Sandeep and Ravishankar, 2014). In order to overcome this challenge, the UK government is developing an information and communication

technology profession framework and competency and skills framework to define government ICT roles (NAO, 2011b). Figures 4-4 and 4-5 describe these two frameworks.

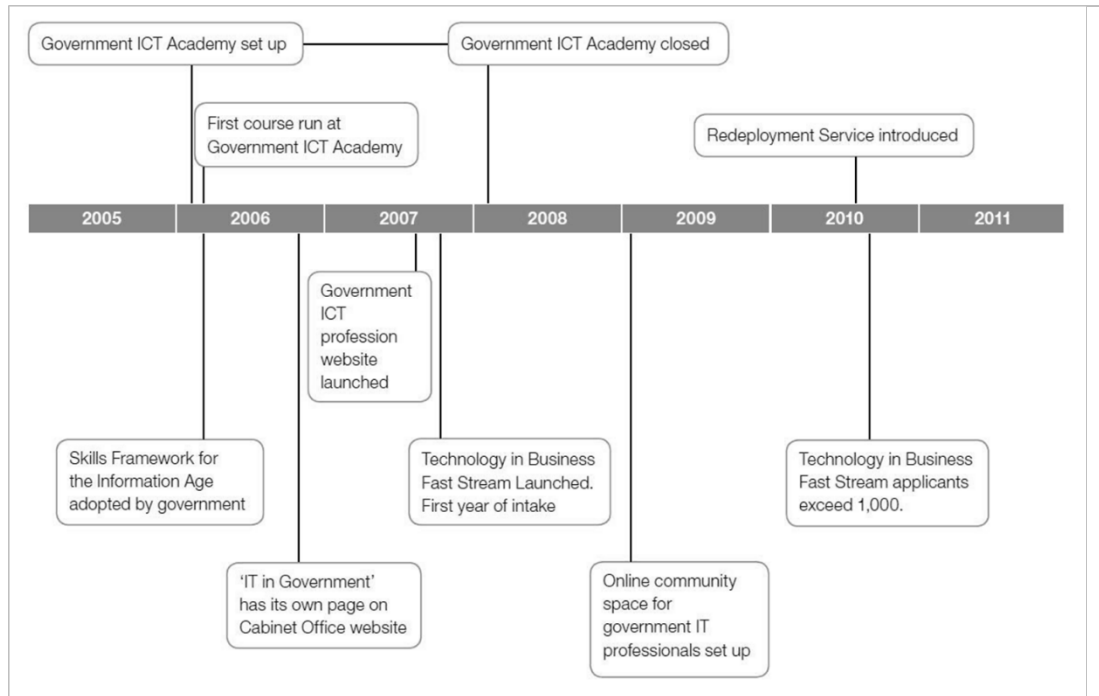


Figure 4-4: Developing the ICT profession framework in the UK government (NAO, 2011b)

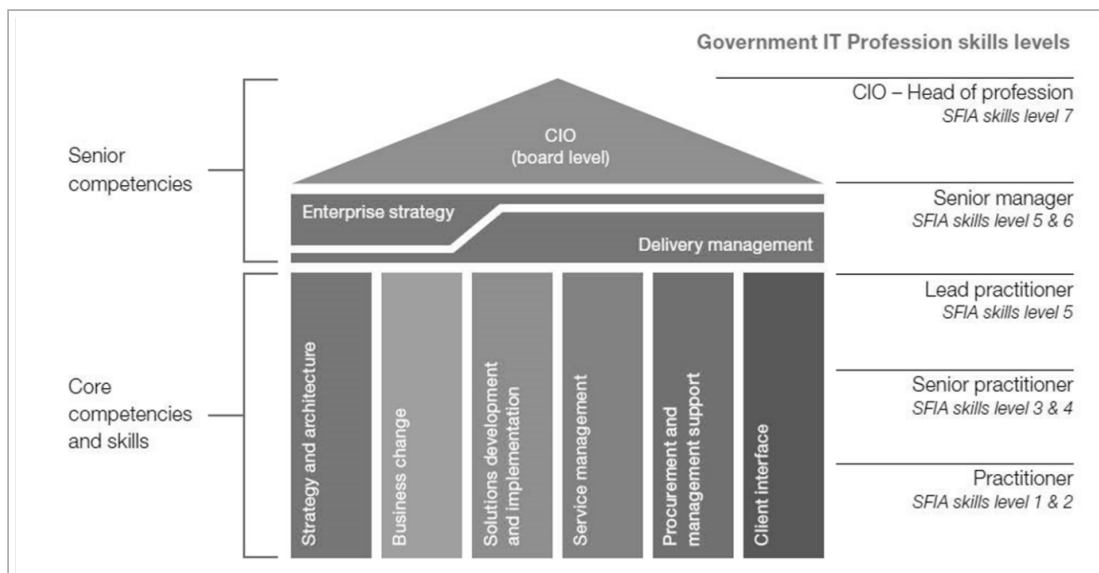


Figure 4-5: Competency and skills framework to define government ICT roles (NAO, 2011b)

Despite these efforts, the UK government is still considering the difficulties of managing IS projects and benefits. In this regard, a government report (NAO, 2009b) identifies the common causes of project failure for the C-NOMIS project by eight factors, as below. The C-NOMIS project was intended to support new working processes, to integrate current systems into one system and to allow officers and others to access the database in real time. However, major project problems occurred, such as the project being over-budget and late, and this gave rise to the difficulties in realising operational benefits. The list below summarises the eight common causes of project failure for the C-NOMIS project:

- Lack of a clear link between the project and the organisation's key strategic priorities, including agreed measures of success
- Lack of clear senior management and ministerial ownership and leadership
- Lack of effective engagement with stakeholders
- Lack of skills and proven approach to project management and risk management
- Too little attention to breaking development and implementation into manageable steps
- Evaluation of proposals driven by initial price rather than long-term value for the money (especially securing delivery of business benefits)
- Lack of understanding of and contact with the supply industry at senior levels of the organisation
- Lack of effective project team integration amongst clients, the supplier team and the supply chain

Universal Credit is a major reform to welfare in the UK, and it aims for the improvement of wider welfare reform in the UK (NAO, 2013d). According to the UK government's report (Major Projects Authority, 2015), the total estimated budget of the Universal Credit project is £15.84bn, and it is expected to be completed in 2020. However, the estimated cost was already more than £12 billion in 2012. Similar to Universal Credit, E-borders and the successor scheme programme have also been revealed as challenging. The objective of E-borders and the successor programme is to advance the way of managing UK border and traveller data. The Assessment of National Audit Office says that the programme has various technical,

managerial and commercial challenges that led to programme failure, e.g. £275 over-budget, eight-year over-schedule and a lack of system performance (NAO, 2015a). Figure 4-6 describes key issues during the E-borders programme between 2003 and 2010.

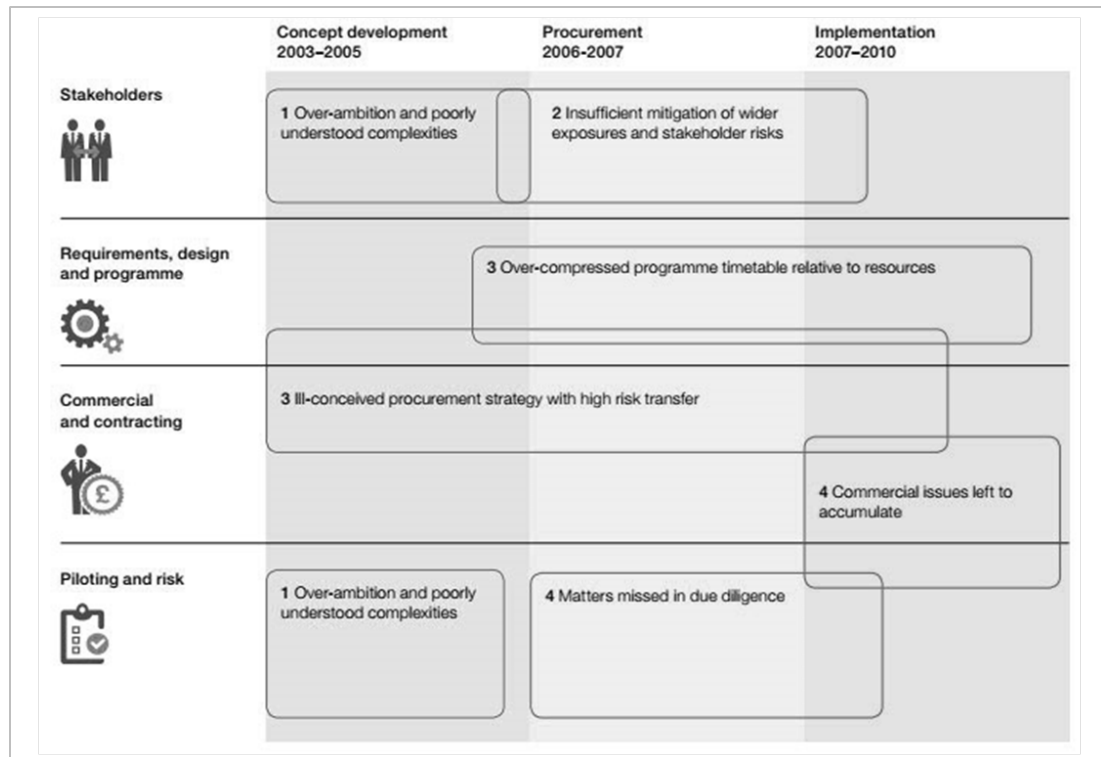


Figure 4-6: Key issues during the e-borders programme (NAO, 2015a)

Summing up, the UK government has recognised the significance of managing projects/programmes, and most guidelines, principles and methodologies have been sufficiently prepared. Nevertheless, government organisations have still experienced managerial difficulties as well as troubles realising the benefits of IS projects. Regarding this, the thesis will make original theoretical contributions that provide an opportunity to rethink IS projects in the UK public sector and project owners' dynamic capabilities. Thus, this research argues that a project owner's dynamic capabilities can facilitate post-implementation benefits through IS projects and operations; see detailed argument in chapter 2, Capabilities in managing projects.

4.3.3 Methodology for Managing Projects: PRINCE2

As outlined in section 4.3.1, for the UK Government Major Projects Portfolio, the PRINCE2 model has become a *de facto* standard used extensively based on the mandated policy of the UK government (OGC, 2009). The PRINCE2 methodology is composed of seven principles, seven themes and seven processes. This is followed by a brief description of the principles and themes, and the process model is covered in section 3.2.1, Information Systems Projects and Life Cycle.

The PRINCE2 model is not based on a specific project scale, organisation, geography or culture. By adopting a principle-based approach, the methodology model is developed for application to any type of project or programme. The principles-based seven principles are:

- Continued business justification
- Learn from experience
- Defined roles and responsibilities
- Manage by stages
- Manage by exception
- Focus on products
- Tailor to suit the project environment

In addition to these principles, the PRINCE2 methodology standardises the major aspects of project management into seven factors: business case, organisation, quality, plans, risk, change and progress. Table 4-6 summarises the seven themes and key descriptions.

Table 4-6: The PRINCE2 themes (OGC, 2009)

Theme	Description
Business case	The project starts with an idea which is considered to have potential value for the organisation concerned. This theme addresses how the idea is developed into a viable investment proposition for the organization and how project management maintains the focus on the organization's objectives throughout the project.
Organization	The organization sponsoring the project needs to allocate the work to managers who will be responsible for it and steer it through to completion. Projects are cross-functional so the normal line

Quality	management structures are not suitable. This theme describes the roles and responsibilities in the temporary PRINCE2 [®] project management team required to manage the project effectively. The initial idea will only be understood as a broad outline. This theme explains how the outline is developed so that all participants understand the quality attributes of the products to be delivered and then how project management will ensure that these requirements are subsequently delivered.
Plans	PRINCE2 [®] projects proceed on the basis of a series of approved plans. This theme complements the Quality theme by describing the steps required to develop plans and the PRINCE2 [®] techniques that should be applied. In PRINCE2 [®] , the plans are matched to the needs of the personnel at the various levels of the organization. They are the focus for communication and control throughout the project.
Risk	Projects typically entail more risk than stable operational activity. This theme addresses how project management manages the uncertainties in its plans and in the wider project environment.
Change	This theme describes how project management assesses and acts upon issues which have a potential impact on any of the baseline aspects of the project (its plans and completed products). Issues may be unanticipated general problems, requests for change or instances of quality failure.
Progress	This theme addresses the ongoing viability of the plans. The theme explains the decision-making process for approving plans, the monitoring of actual performance and the escalation process if events do not go according to plan. Ultimately, the Progress theme determines whether and how the project should proceed.

On the basis of clear principles and themes, the PRINCE2 methodology, originated from the context of IS implementation, can benefit any type of industry or organisation (OGC, 2009). Obviously, a standardised methodology model can provide an efficient management structure to organisations that lack experience or relevant knowledge. At the same time, however, it also has limitations. First, the detailed characteristics of an organisation cannot be reflected in a standard model. A project is a unique pattern of work by certain people, organisations and environments. Thus, every project has its own originality that cannot be covered by a wide-use methodology model. Second, the PRINCE2 focusses heavily on project planning and execution rather than project closing. There is also a relatively insufficient guideline on the importance of project benefits after a project close because the PRINCE2

regards project closing as the stage when a project deliverable is accomplished. A widely used model cannot achieve this aspect due to different strategic directives of every organisation. Third, different aims and perspectives between project suppliers and owners are not fully considered. In order to address these limitations, this thesis suggests the necessity of differentiated capabilities of a project owner to realise business benefits after a project.

4.4 Gap Identification and Summary

This chapter covered the key features of public sector business, public IS projects and general IS project information in the UK public sector. Due to the distinctive characteristics of the public sector, more managerial uncertainties and difficulties have existed. In addition, the changeability and complexity of IS have increased the managerial chaos and the need for suitable management capabilities in the public sector. In the same context, the UK government has experienced challenging IS projects continually with frequent over-budgets, over-schedules and little system quality. Thus, a distinctive approach to creating and facilitating capabilities is essential to deal with public IS projects and their management.

As reviewed in this chapter, numerous studies have reported the difficulties of managing IS projects in the public sector and the capabilities necessary to deal with them. However, none of the previous studies has examined the importance of a project owner's dynamic capabilities to carry out public IS projects and to realise operational benefits from them. In response to the above literature review, this thesis will put more research emphasis on the necessity for differentiated IS project capabilities for public organisations.

4.5 Summary of Literature Review and Research Questions

4.5.1 Summary of Literature Review: Gap Identification

In chapters 2, 3 and 4, relevant literature was reviewed and criticised on the basis of the review framework; see details in Figure 1-3. Chapter 2 addressed capability issues in a project management environment. Chapter 3 covered IS and benefits

realisation management. Chapter 4 reviewed the context of the public sector environment and IS projects, especially focussing on the UK public sector.

In the first literature review chapter, diverse concepts of capability were defined in advance of reviewing capability issues in managing projects. The definitions and approaches of capability, competency, organisational capability and dynamic/operational capability were understood. In particular, diverse definitions of dynamic capabilities were reviewed, and the conceptual coverage of dynamic capabilities for this study was clarified. After that, the concepts of project and programme and their management were clarified by analysing the conceptual debates between project management and programme management.

In the second literature review chapter, first, the conceptual difference between information systems and information technology was reconfirmed. Second, the generally accepted IS project life cycle models were reviewed to identify their limitations. Third, the difficulties and complexities of managing IS projects were studied. Fourth, the definitions of benefits, values, benefits management and benefits management process/life cycle were reviewed to determine why realising IS project benefits is still problematic.

In the third literature review chapter, the theoretical and practical differences between public and private project management environments were identified. After pointing out the distinctive characteristics of managing public projects, IS project initiatives, management portfolio and key managerial issues in the UK public sector were examined in detail.

On the basis of the literature review, a few research gaps and limitations were identified, and this thesis highlights five major gaps that will be addressed in the research. First, most project capability studies have been heavily weighted towards a project supplier's project execution. This execution-based approach can lead to little research attention on the importance of a project owner's post-project benefits realisation capability. Thus, the necessity of a project owner's differentiated project capabilities is emphasised by recognising the wider context of the project owner organisation's ecosystems.

In this regard, second, the formulation of project capabilities also does not distinguish between dynamic capabilities for benefits realisation and operational capabilities for project execution. In other words, this thesis claims a contextual similarity between a project owner's capability and the concept of dynamic capability with respect to benefits realisation in a continually changed IS project environment (Figure 2-4).

Third, a lack of research attention to managing project benefits was also emphasised by reviewing the debates about the theoretical difference between the management of 'project' and 'programme'. A few studies consider benefits management issues as a part of programme management. However, this thesis believes that realising post-implementation benefits from a single IS project is also critical to a project owner.

Fourth, the limitations of generally accepted IS project life cycle models were criticised. Most project life cycle studies have focussed only on the managerial boundary from project initiation to project closing. Thus, a project owner's front-end capabilities and operational benefits after the project delivery are not considered in those life cycle models. The necessity of a continual approach from an IS project stage to an IS benefits management stage was pointed out.

Fifth, the difficulties of managing public IS project were emphasised. Due to a lack of internal capabilities and the complexities of public project stakeholders, there is a clear difference between public and private project management. The need to enhance internal project capabilities in the public sector to realise IS benefits more efficiently was highlighted.

4.5.2 Revising Research Questions

In response to the review in chapters 2, 3 and 4, this study poses the following research questions to examine the context of owner dynamic capabilities in IS projects in the public sector:

- Research Question 1 (RQ1) - What are the common issues and difficulties in managing information systems projects in the UK public sector?

- Research Question 2 (RQ2) – Which dynamic capabilities are required by a project owner for IS projects in the public sector?
- Research Question 3 (RQ3) - How can owner dynamic capabilities contribute to realising post-implementation benefits of IS projects in the public sector?

RQ1 is intended to find out the most common managerial issues in IS projects in the UK public sector. In order to address this question, data coding and coding frame development will be carried out. On the basis of the developed data hierarchy, RQ1 can be answered. The aim of RQ2 is to identify a project owner's dynamic capabilities based on the RQ1. In response to the literature review (review data) and the analysis of the answers to RQ1 (collected data), RQ2's answer can be found. RQ3 targets the important gap in the IS literature (see section 3.4). By examining the case-oriented project issues and the identified owner dynamic capabilities, the beneficial impacts of owner dynamic capabilities can be revealed. The details of selected methods and the sources of data are explained in the next chapter.

CHAPTER 5. RESEARCH METHODOLOGY

5.1 Chapter Overview

Quantitative data analysis is adopted as the principal methodological approach. Due to the characteristics of the unique data set (NAO Value-for-Money (VfM) report), a content analysis method is used in this research. In order to enrich the result, further qualitative approach will support the quantitative result. This kind of multi-method approach can avoid the simplistic dichotomy between qualitative and quantitative research (Brewer and Hunter, 1989). This mixed approach can enhance the richness of data analysis in social science knowledge by combining the strengths of the two generic approaches. Based on this context, textual data from NAO reports were initially quantified (collecting UK project issues), and the quantified results were analysed in further to complement the quantified result (analysing case-oriented narrative meanings); if a remarkable result is revealed in the quantification, the contextual issues of the result is analysed in detail based on the actual project case data. Thus, the case-oriented further analysis is not rather fully quantitative, but it can contribute to the richness of the quantified results to reinforce the limitation of quantitative approach. The method applied for this research is content analysis, and the documentary data have been analysed on the basis of the abductive reasoning approach. To raise the efficiency of the data analysis process, both Nvivo 9 and Microsoft Excel programs have been employed.

In this chapter, first, a general description of the methodological approach will be provided, including common research methodologies in IS research. By reviewing the research trends in an IS field, the value of the content analysis method selected in this study will be justified. Then, the explanation of computer-assisted qualitative data analysis (CAQDAS) is provided. The efficiency of using CAQDAS in a qualitative study is well known in academia. The advantages of using CAQDAS will be highlighted to justify its beneficial use.

Second, the details of the content analysis method will be explained, including the origin and features of content analysis. First, the history of content analysis will be outlined. Then, the comparison between qualitative and quantitative data collection/analysis will be reviewed in the context of content analysis. On the basis of the review, the justification for application of the content analysis method will be explained.

Third, as the main section of this chapter, the source of data (NAO VfM reports), the procedure of data collection and the Nvivo coding frame will be introduced. Specifically, data coding and the coding frame development processes, the critical step of content analysis, will be explained. After that, the procedure for utilising Nvivo software and a few examples will be explained.

As the last main section of the chapter, the full details of UK project cases (selected research data) will be introduced before moving on to the next chapter, which covers quantified results and qualitative findings.

5.2 Methodological Approach

Numerous research approaches and methods have been employed in IS studies. Selecting appropriate research methods is critical to justify the research approach and the reliability of results. In particular, IS and information technology are always so new that it could be dangerous to research with any methodological biases (Mumford *et al.*, 1985). In advance of introducing applied methods and methodologies for this thesis, understanding the research paradigms and methodological trends in IS research is worthwhile to strengthen the methodological validity of the study.

5.2.1 Research Trends in Information Systems

Chen and Hirschheim (2004) highlight the necessity for research attention on the importance of paradigmatic and methodological examination of IS research. In order to suggest an advanced research direction for IS, the authors analyse IS research methodologies and paradigms with 1,893 articles published in eight major IS publication outlets between 1991 and 2001. The research was mainly carried out on the following areas: empirical vs. non-empirical, quantitative vs. qualitative and cross-sectional vs. longitudinal. Tables 5-1, 5-2 and 5-3 summarise the result of the IS research trend they found.

In Table 5-1, the overall research trend of empirical and non-empirical studies is described. As seen in the table, a majority of IS studies took an empirical approach. In the early 1990s, two research trends were balanced in terms of the quantity of

published IS studies. Since 1993, however, the number of empirical studies has exceeded non-empirical studies over the years, and this has widened the gap between two research approaches. Especially in 2000, the number of empirical IS studies (134) is more than two times that of non-empirical studies (60).

Table 5-1: Overall trend of empirical vs. non-empirical studies (Chen and Hirschheim, 2004)

Year	Empirical	Non-empirical
1991	66	82
1992	64	72
1993	85	64
1994	102	79
1995	99	76
1996	117	70
1997	111	66
1998	120	48
1999	124	72
2000	134	60
2001	109	73
Total	1,131	762

Table 5-2 explains the overall IS research trend of quantitative and qualitative approaches. In the early 1990s, the number of qualitative studies was extremely low in IS disciplines. Though there was little gap between quantitative and qualitative research during 1997 and 1998, a gap between the two has grown very big. Quantitative studies have dominated the IS research environment. The mixed approach has remained steady and shown only a slight fluctuation.

Table 5-2: Overall trend of quantitative vs. qualitative studies (Chen and Hirschheim, 2004)

Year	Quantitative	Qualitative	Mixed
1991	50	6	10
1992	49	7	8
1993	49	22	14
1994	73	23	6
1995	63	29	7

1996	65	36	16
1997	54	47	10
1998	59	52	9
1999	75	34	15
2000	70	54	10
2001	73	31	5
Total	680	341	110

In terms of the analysis of time series, cross-sectional studies have been a continuous research trend in IS disciplines. Between 1991 and 2001, 1997 was the only year in which the number of longitudinal studies (51) was bigger than the number for cross-sectional ones (50). As shown in Table 5-2, the number of qualitative studies was the highest in 1997. This synchronised point can be interpreted as the qualitative research method usually requiring a longer term research process than quantitative methods (Chen and Hirschheim, 2004). Many fewer multiple snapshots and repeated measures studies have been conducted than the other two dominant trends, with a slight fluctuation.

Table 5-3: Overall trend of cross-sectional vs. longitudinal studies (Chen and Hirschheim, 2004)

Year	Cross-sectional	Longitudinal	Multiple Snapshots	Repeated Measures
1991	53	11	0	2
1992	45	12	5	2
1993	55	23	2	5
1994	70	22	4	6
1995	66	30	3	0
1996	65	40	6	6
1997	50	51	7	3
1998	63	52	3	2
1999	65	41	12	6
2000	69	56	5	4
2001	66	36	1	6
Total	667	374	48	42

To sum up, Chen and Hirschheim's (2004) meta-analysis of IS disciplines shows that empirical, quantitative and cross-sectional studies have evidenced a dominant and

biased research trend in IS disciplines. In addition to the research trends, the methodological approach of IS research will be analysed further in the next section. After that, the rationale for utilising content analysis in this thesis will be given with the explanation of the features of CAQDAS-based qualitative analysis.

5.2.2 Research Methodologies in Information Systems

A meta-analysis of IS journals is not common, but Professor Prashant Palvia has also made a continuous contribution to analysing IS research methods and trends (Palvia *et al.*, 2003, 2004, 2007, 2015). Palvia *et al.* (2003) categorise the most common 14 methodologies in IS research. Though the taxonomy does not distinguish the concepts of method and methodology clearly, it still has a certain validity as an a priori model to categorise IS articles. Beissel-Durrant (2004) identifies five reasons why there is not a unique classification scheme and why development of the research methods typology has encountered a number of difficulties. The following list outlines the five reasons:

- Some methods and keywords apply to other broader categories.
- Some research method typologies are designed for use in certain research projects or training programmes, and they may not be readily usable for the categorisation of all the previous literature.
- Some non-methods can be added into the category for practical reasons (e.g. official statistics).
- Some terminologies in the lists of research typology relate to all or certain stages of research projects.
- Some methods and methodologies are interdisciplinary.

On the basis of the a priori taxonomy, Palvia *et al.* (2004) present the research methodology trends in published management information systems (MIS) research for a recent 11-year period, from 1993 to 2003; Table 5-4 summarises the 14 common methodologies in IS research. Based on the collected data, methodology trends between 1998 and 2003 are found by analysing 1,226 articles published in seven mainstream MIS journals: *Communications of the ACM* (CACM), *Decision Sciences* (DS), *Information and Management* (I&M), *Information Systems Research*

(ISR), *Journal of Management Information Systems* (JMIS), *Management Information Systems Quarterly* (MISQ) and *Management Science* (MS). Palvia *et al.* (2015) conduct the same pattern of analysis again for 2004-2013. In terms of data collection, the set of seven IS journals is slightly different from their previous 10-year study; CACM and MS are excluded, and the *Journal of the Association for Information Systems* (JAIS) and *European Journal of Information Systems* (EJIS) are included in their data collection range. Table 5-5, developed from both results, shows the results of IS research methodology trends from 1993 to 2013.

Table 5-4: 14 common methodologies in MIS research (Palvia *et al.*, 2003)

Methodology	Description
Speculation/ commentary	Research that derives from thinly supported arguments or opinions with little or no empirical evidence.
Frameworks and conceptual model	Research that intends to develop a framework or a conceptual model.
Library research	Research that is based mainly on the review of existing literature.
Literature analysis	Research that critiques, analyses, and extends existing literature and attempts to build new groundwork, e.g. it includes meta-analysis.
Case study	Study of a single phenomenon (e.g. an application, a technology, a decision) in an organization over a logical time frame.
Survey	Research that uses predefined and structured questionnaires to capture data from individuals. Normally, the questionnaires are mailed (now, fax and electronic means are also used).
Field study	Study of single or multiple and related processes/ phenomena in single or multiple organisations.
Field experiment	Research in organizational setting that manipulates and controls the various experimental variables and subjects.
Laboratory experiment	Research in a simulated laboratory environment that manipulates and controls the various experimental variables and subjects.
Mathematical model	An analytical (e.g. formulaic, econometric or optimization model) or a descriptive (e.g. simulation) model is developed for the phenomenon under study.
Qualitative research	Qualitative research methods are designed to help understand people and the social and cultural contexts within which they live. These methods include ethnography, action research, case research, interpretive studies, and examination of documents.
Interview	Research in which information is obtained by asking respondents

	questions directly. The questions may be loosely defined, and the responses may be open-ended.
Secondary data	A study that utilizes existing organizational and business data, e.g. financial and accounting reports, archival data, published statistics, etc.
Content analysis	A method of analysis in which text (notes) are systematically examined by identifying and grouping themes and coding, classifying and developing categories.

Table 5-5: Rank of research methodology based on count and percentage of papers using it (Palvia *et al.*, 2015)

Methodology	1993-2003		2004-2013		1993-2013	
	Primary	Secondary	Primary	Secondary	Total	Rank
Survey	482	55	655	27	1219 (23.8%)	1
Laboratory experiment	233	45	263	10	551 (10.7%)	2
Case study	203	31	251	10	495 (9.6%)	3
Frameworks & conceptual model	260	28	167	4	459 (8.9%)	4
Mathematical modelling	212	45	195	2	454 (8.8%)	5
Secondary data	67	44	246	19	376 (7.3%)	6
Field research	134	28	171	10	343 (6.7%)	7
Speculation/commentary	202	24	89	0	315 (6.1%)	8
Literature analysis	84	32	85	2	203 (3.9%)	9
Qualitative analysis	8	12	138	18	176 (3.4%)	10
Content analysis	25	8	89	15	137 (2.6%)	11
Interview*	58	56	0	0	114 (2.2%)	12
Literature review	32	19	42	5	98 (1.9%)	13
Field experiment	52	14	30	2	98 (1.9%)	14

Design science	N/A	N/A	66	5	71 (1.3%)	15
	2052	441	2487	129	5109	

* “Note that we did not include ‘interviews’ as a separate methodology in our study because it is often a part of case studies and other qualitative methodologies” (Palvia *et al.*, 2015, p. 639).

In addition to the comprehensive methodological trend exploration of IS journals, Palvia *et al.* (2007) perform further analysis of articles published in *Information and Management* (I&M). The I&M journal has been regarded as a leading academic journal in the IS field. By collecting the papers published in the journal from 1998 through 2005, the authors carry out a more detailed analysis of which IS topics are often investigated and which methodologies are employed the most. As shown in Table 5-6, the survey methodology is employed as the most frequently used one, far exceeding other methodologies. In contrast, a few methodologies, including content analysis, library research and qualitative research (other than the case method), are identified as the least preferred methods of research amongst IS researchers. Thus, one can say that content analysis, the method this thesis adopts, is a relatively new research approach to deal with IS topics that can inspire new findings and perspectives:

“Surveys can attain high levels of external validity, however they are known to suffer from worldly richness, lack of control, and low internal validity. Qualitative methods, such as case research and field studies, allow the investigators to retain holistic and meaningful characteristics of real-life events while experiments allow higher control and internal validity.

...

The low positioning of content analysis, library research, and qualitative research (other than the case method) points to a preference towards the more established methodologies. The lower rankings can also be explained by the fact that IS is still a relatively new field and the lack of readily available and published secondary data poses constraints on researchers”.

(Palvia *et al.*, 2007, p. 7)

Table 5-6: Methodology ranks and frequencies in Information and Management journal (Palvia *et al.*, 2007)

Method	Frequency	Percentage
Survey	199	41.54
Case study	47	9.81
Laboratory experiment	41	8.56
Field study	41	8.56
Frameworks and conceptual model	33	6.89
Interview	22	4.59
Literature analysis	22	4.59
Speculation/commentary	18	3.76
Mathematical model	18	3.76
Secondary data	15	3.13
Field experiment	10	2.09
Content analysis	8	1.67
Library research	4	0.84
Qualitative research	1	0.21
Total	479	100

In terms of the research approach, this thesis follows both quantitative and qualitative approaches. In other words, textual data will be initially developed as a form of data hierarchy with quantification. Then the text-based hierarchy and the quantified data will be qualitatively analysed in detail to enrich the results. Moreover, this thesis adopts a content analysis method due to the characteristics of the unique data set (NAO VfM report). As explained in the earlier sections, content analysis is a relatively new research approach in IS disciplines that is able to inspire original and novel insights. Further justification for choosing a content analysis method and its advantages will be provided in the next section, after the explanation of CAQDAS.

5.2.3 Qualitative Analysis and CAQDAS

Many researchers have emphasised the value, impact and relative importance of quantitative and qualitative analysis approaches (Myers, 1997; Denzin and Lincoln, 2011). Amongst others, Bernard and Ryan (2010) provide the context of research methods in a two-by-two matrix to compare qualitative/quantitative data and analysis, as summarised in Table 5-7. Based on this approach, classical content analysis and

contemporary content analysis can be applied to cell C and A, respectively; this thesis has a mixed approach for both types of content analysis to minimise the limitations of the application of a single content analysis method.

Table 5-7: Qualitative/quantitative data and analysis (Bernard and Ryan, 2010)

Analysis	Data	
	Qualitative	Quantitative
Qualitative	<u>A</u> Interpretive text studies, Hermeneutics, Grounded Theory	<u>B</u> Search for and presentation of meaning in results of quantitative processing
Quantitative	<u>C</u> Turning words into numbers. Classical content analysis, word counts, free lists, pile sorts, etc.	<u>D</u> Statistical and mathematical analysis of numeric data

CAQDAS refers to software that supports qualitative data analysis (Hahn, 2008). In the early 1980s, innovative researchers tried to solve their research challenges through computing functions, and this effort emerged as the first generation of CAQDAS, or QDAS (Schreier, 2012). Today, lots of similar CAQDAS software has been developed and utilised, including Nvivo, MAXQDA and ATLAS, and software for computer-aided content analysis has also been developed, including Textpack and General Inquirer. Lewins and Silver (2007) suggest a step-by-step process for using software in qualitative software with four main components of qualitative data analysis: exploration, organization, interpretation and integration of research data materials. Thus, “various QDAS program features support analysis tasks including linking and grouping, annotating and searching, writing and making connections, and incorporating references and combining of converting findings” (Davidson and di Gregorio, 2011, p. 628).

Through CAQDAS, qualitative researchers can derive functional advantages in terms of the efficiency of data analysis, especially for developing data categories and the coding frame. First, large-scale data are managed more easily by using software features (e.g. identifying relevant passages and querying specific keywords with specific conditions). Second, it is easy to change the node name, existing data

categories and sub-categories. Third, the data category structure can be updated by simple drag-and-drop. Fourth, by using the labelling function, researchers can turn a phrase in research materials into a category name or label.

For this study, Nvivo 9 software has been employed to carry out inductive content data coding and coding frame development. Adopting this qualitative analysis software offers more integrated and visualised functionalities that facilitate the efficiency of data analysis (Davidson and di Gregorio, 2011; Kuckartz, 2014).

5.3 Content Analysis and Methodological Justification

5.3.1 Origin of Content Analysis

The term content analysis has been used for more than 60 years (Krippendorff, 2013). Krippendorff (1980) defines content analysis as a research technique for analysing valid inferences from data in their own context. The origin of content analysis is a quantitative perspective in finding out the frequency of words and categories (Schreier, 2012; Krippendorff, 2013).

The history of text/content analysis and its theoretical development can be sorted into three phases. First, the early application of content analysis arose in the late seventeenth and eighteenth centuries. During these centuries, church potentates were the progenitors of the concept of modern content analysis. They endeavoured to capture the frequency of certain religious texts or keywords - such as God or Kingdom of Heaven - from putative unorthodox materials (Schreier, 2012). Then, in the second half of the nineteenth century, mass media and newspapers became of great interest amongst various scholars. In this regard, there was interest in comparing newspapers with respect to the number of certain keywords and the percentages of a page devoted to given topics, as well as the simple number of articles, to understand the power of the mass media in communication of public opinions. The second phase of the conceptualisation of content analysis came in the 1930s and 1940s. During this time, content analysis was developed as a research method in the empirical social sciences, including psychology and sociology, to examine social stereotypes or attitudes (Krippendorff, 2013). Before and after the 1940s, as the third phase, propaganda analysis was the main aim of content analysis

in a political perspective. Scholars assert that 1941 was the birth year of content analysis (Kuckartz, 2014). After that, Berelson (1952, p. 18) conceptualised it as “a research technique for the objective, systematic and quantitative description of the manifest content of communication”.

Krippendorff (2013) provides the research framework for content analysis in six aspects: texts, research questions, context, analytical constructs, inferences and validating evidence. A text is the original data, the starting point of research, and a research question is the target of the researcher’s inferences. After clarifying the research questions, a context can be identified by constructing analytical procedures of an inferential nature. As seen in Figure 5-1, the author emphasises the significance of contextual meanings and analytical construction from the original texts to find the answers to research questions. In this process, moreover, the original text can also be the source of validating evidence. On the basis of the chronological history and the framework of content analysis, its concept evolved from ‘finding out purposeful keywords’ to ‘analysing the meanings of contextual inference’ from original text materials.

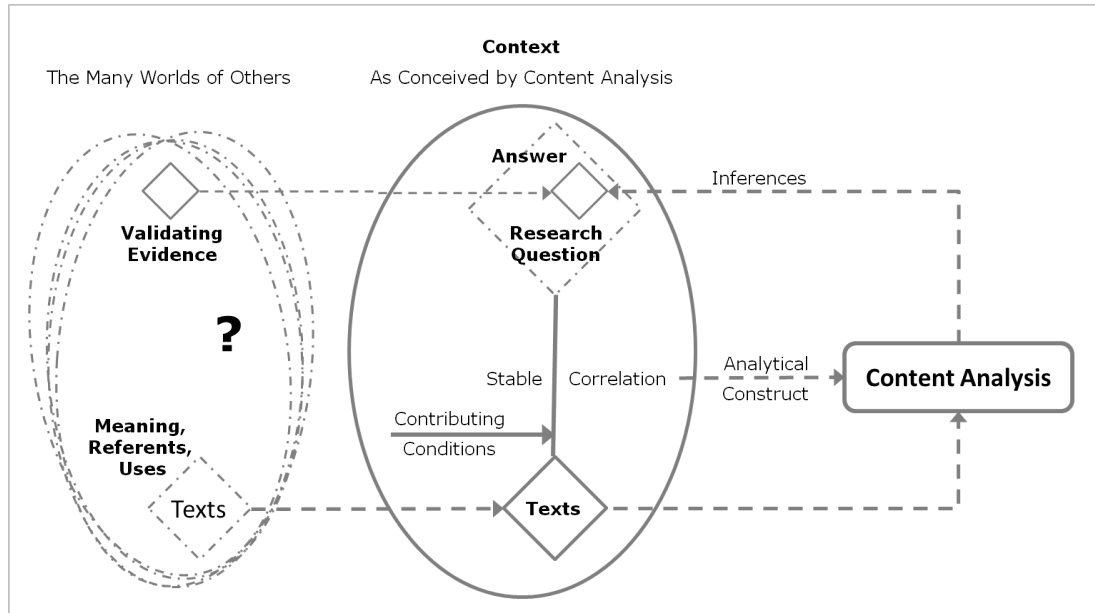


Figure 5-1: Framework for content analysis (Krippendorff, 2013)

5.3.2 Content Analysis with a Qualitative Approach

As outlined in the previous section, the origin of content analysis is in the value of quantitative text analysis. A few researchers, however, have emphasised the significance of qualitative content studies for understanding the context of quantitative data and their formulation (Schreier, 2012). For example, Berelson (1952, p. 114) demonstrates that “a great number of non-numerical content studies call for attention by virtue of their general contribution in insight and interest”. Similarly, Kracauer (1952) asserts that too much quantification of data can give rise to the inaccuracy of analysis. The author suggests several reasons. For instance, the meaning of texts is often very complex and holistic. Moreover, the meaning is not always manifest and clear. Thus, more theoretical and context-based qualitative research can complement the limitations of quantitative content analysis (Kuckartz, 2014). Table 5-8 summarises the differences between quantitative and qualitative content analysis. Qualitative content analysis focusses more on latent meaning and inferential context, and it has more variability in being carrying out.

Table 5-8: Differences between quantitative and qualitative content analysis (Schreier, 2012)

Quantitative Content Analysis	Qualitative Content Analysis
<ul style="list-style-type: none"> • Focus on manifest meaning • Little context needed • Strict handling of reliability • Reliability checks more important than validity checks • At least partly concept-driven • Fewer inferences to context, author, recipients • Strict sequences of steps 	<ul style="list-style-type: none"> • Focus on latent meaning • Much context needed • Variable handling of reliability • Validity checks just as important as reliability checks • At least partly data-driven • More inferences to context, author, recipients • More variability in carrying out the steps

In order to overcome the limitation of using a single methodology, this thesis adopts a mixed approach of using content analysis on both quantitative and qualitative perspectives. The textual data will be quantified first, then the data will be thoroughly analysed qualitatively to find the case-oriented interpretive meanings.

This suggests that the fundamental aim of the applied methodology in this thesis is expanded content analysis with quantitative data and qualitative analysis. Schreier (2012) provides the key features of qualitative research using eight aspects - interpretive, naturalistic, situational, reflexive, emergent flexibility, inductive, case-oriented and validity, which she emphasises; see details in the list below. Thus, to analyse case data and their narrative meanings, an interpretive approach will be applied. Details about data collection and the analysis process will be introduced in section 5.4. Research Design. The following list summarises the eight features of qualitative research (Schreier, 2012):

- Interpretive: Deals with symbolic material that requires interpretation; different interpretations of the same material can be valid; its focus is on research questions where personal or social meaning is explored.
- Naturalistic: Preserves real-life context and does not manipulate the research setting.
- Situational: Context always taken into account; the focus is on particulars.
- Reflexive: Reflexivity of participants is acknowledged; the researcher takes into account how, as researcher, he or she co-creates the data.
- Characterised by emergent flexibility: Can adapt all aspects of the research process during the study.
- Inductive: Use open measures for data collection; in data analysis let key concepts emerge from the data.
- Case-oriented: Study cases in their entirety and in depth.
- Focussed on validity: Both the extent to which the instruments capture what the researcher wants to capture and the overall quality of the study.

After identifying a data set and before developing a coding frame, data category development is a critical procedure in content analysis. Mayring (2000) suggests two types of step models for data category development: inductive and deductive. As the origin of research data takes the form of texts and documents, the way of reasoning and formulating data is the most significant aspect during the data collection and analysis processes. An inductive approach focusses on what the actual research data imply. Depending on the meaning of the data, various data nodes are created, categorised and revised. This approach, therefore, helps researchers understand what

the analysis data really mean, and the understood contexts can be directly applied to the data category. In contrast, a deductive approach follows the theory-based definition of analysis that develops the data nodes and hierarchy. Then, the content data are coded into the researcher's pre-developed data structure. The strength of deductive data coding is that the overall data node structure is more logical as it comes from the context of pre-developed theory. Figure 5-2 summarises the two step models.

In this thesis, the inductive category development approach is selected in order to create data nodes and structure. Though the three main nodes are determined in response to the literature review (deductive), all of the sub-nodes are created by the actual NAO report data within an inductive approach (inductive); see details in section, 5.4.3 Data Coding and Analysis. In other words, creating/revising data nodes (categories) and interpreting context in textual data are iteratively carried out to develop the data hierarchy as near as possible to the material (Mayring, 2000). This can lead to the advantage of the final version of the data hierarchy being clearly and evidently created by the original data.

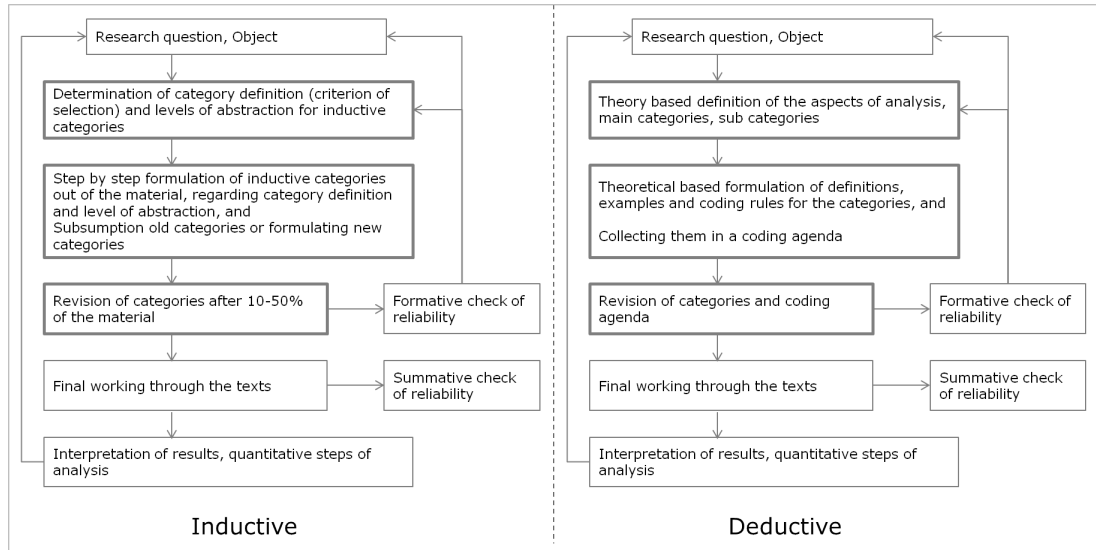


Figure 5-2: Step models of inductive and deductive category development (Mayring, 2000)

There has been a misunderstanding of the difference between data coding (quantitative) and qualitative content analysis. Even though “category plays a role, and the process of data analysis is referred to as coding” in both coding and

qualitative content analysis, a clear conceptual difference exists between the two that needs to be understood in advance of carrying out qualitative content analysis (Schreier, 2012, p. 40). Schreier (2012) summarises the difference between coding and qualitative content analysis (Table 5-9).

Table 5-9: Differences between coding and qualitative content analysis (Schreier, 2012)

Coding	Qualitative Content Analysis
<ul style="list-style-type: none"> • Analytic: How do categories relate? • Codes are mostly data-driven • Iterative/cyclic procedure • Focus on trustworthiness and credibility <ul style="list-style-type: none"> ○ creating and applying codes are one step ○ focus of code definitions is on the conceptual level ○ codes are not mutually exclusive ○ no segmentation necessary 	<ul style="list-style-type: none"> • Descriptive: How do data relate? • Codes are part data-driven and part concept-driven • Linear procedure with cyclic elements • Focus on consistency <ul style="list-style-type: none"> ○ creating and applying codes are different steps ○ focus of code definitions is on how to recognise instances of the concept in the data ○ subcategories for the same main category are mutually exclusive ○ before coding, material must be divided into units of coding

5.4 Research Design

5.4.1 National Audit Office Value-for-Money Report

On the basis of the methodological approach explained in the previous sections, NAO reports, the main source of data for content analysis, were explored to examine the key features and capability issues of the UK government’s IS projects. Selected reports were electronically coded to develop a data hierarchy. Following this, the initially quantified results, developed by using frequency counts to present overviews of the data, were analysed qualitatively by going back to the original texts of highly coded data nodes. This approach follows earlier works on the construction (Dalton, 2007) and defence (Kebede, 2011) sectors using the same methodology.

The NAO scrutinises the spending in the UK public sector on behalf of Parliament. Published NAO reports are reviewed by the Public Accounts Committee in the UK Parliament. By reporting the auditing results to Parliament, the NAO aims to achieve major objectives: to account for the way government departments and bodies use public money, to share government business issues and lessons learnt and to help public service managers improve performance and service delivery (NAO, no date). On the basis of NAO's published works, the focus is on three main strategic priorities: informed government to make its decision making more reliable and comprehensive, financial management to improve managerial activities and financial functions and implementation to encourage departments in terms of cost during the service delivery cycle (NAO, no date). Though many government IS projects have still been failing, the NAO and its reports have made an effort to provide lessons learnt from these huge and complex public IS projects. In this regard, the NAO reports themselves do not identify capabilities; rather, they describe the challenges faced by the project. The applied content analysis finds the most frequently occurring challenges across the UK IS projects, and from this analysis one can infer which capabilities required for successful project delivery would address the most frequently occurring challenges.

In addition, the NAO VfM reports do not provide definitions of success (or failure). Indeed, they try to avoid such judgmental terminology. What they do is identify the challenges that the project studied faced as the project team tried to deliver on its objectives. In other words, one can acknowledge that those reports have a certain level of contextual legitimacy as official data and can be regarded as amongst the most reliable sources of information for analysing UK public sector project management. As the reports are written with own project experience, the reports might have a one-sided perspective; however, an absolute majority of content is based on the actual project documents and is reviewed by an owner's auditor. This is followed by an explanation of how the final set of reports was selected and analysed.

5.4.2 Data Collection

There are two stages in collecting the sources of data. The first stage is to develop the report selection criteria. When the data were collected, there were 1,576 NAO reports

available at the end of 2013. The reports have been filtered using 49 sector categories and 28 performance improvement areas as classified by the NAO itself. From these, all of the published reports in the last 10 years (from 2004 through 2013) are chosen by using the ICT and Systems Analysis category as a filter. One report is excluded as it is regarded as outdated; it was released on 10 February 1984. Table 5-10 shows the full list of the 40 reports selected in stage 1.

In the second stage, the initial set of reports was reviewed by reading the list of contents and the executive summary. The initially selected 40 reports were categorised into 5 types: case, legacy IT service, policy, auditing report and progress report; the titles of each category originate from the reports (see Table 5-10). The main purpose for this re-categorisation is to identify whether the reports cover actual project cases or provide descriptive information such as government IS policies/services. Sixteen reports were identified as case studies; two exactly identical papers were published twice under different names (ICT_12 and ICT_13). Thus, 15 reports were selected as the final set of analysis objects, and they cover 31 UK IS project cases (see Table 5-11).

Table 5-11 lists the 15 selected NAO reports, including document codes, titles, publish dates, references and case codes. The document code and the case code were created during the report selection stage. By using the case code, the UK IS projects covered in each report can be easily identified. For example, three documents (ICT_02, ICT_09_1 and ICT_34) explore the case C-01. The project name of each case code can be found in Table 5-12; see section 5.5, Key Information of 31 Selected Project Cases, for details. Mostly, each report covers one project, excluding two reports. The report ICT_12 contains information about five projects, grouped as one IT programme in the Department for Work and Pensions titled Information Technology Programmes. The report ICT_05_2 outlines 15 projects. To avoid a lack of data consistency and reliability from this exceptional document, I verified the data results twice, including/excluding this document. The verification result does not make any critical changes, so the report ICT_05_2 is included in the final data set; see details in section, 5.4.3 Data Coding and Analysis: Data Error Correction.

Before moving on to the next step, 31 UK cases covered in the reports were briefly reviewed by summarising key data such as project objectives, main deliverables and

sizes to make them more understandable and accessible. The details of the coding and analysis procedure will also be provided in the next sections, 5.4.3, Data Coding and Analysis, and 5.4.4, Developing Data Coding Framework with Nvivo Software.

Table 5-10: Initial set of 40 NAO reports (Stage 1)

Doc Code	Title	Published Date	Type
ICT_01	Administrative Computing in Government Departments	10/02/1984	(Outdated)
ICT_02	Department of Health: The National Programme for IT in the NHS	16/06/2006	Case
ICT_03	Child Support Agency – implementation of the child support reforms	30/06/2006	Case
ICT_04	The delays in administering the 2005 Single Payment Scheme in England	18/10/2006	Case
ICT_05_1	Delivering successful IT-enabled business change	17/11/2006	Policy
ICT_05_2	Delivering successful IT-enabled business change_Case studies of success	17/11/2006	Case
ICT_06	Identity and Passport Service: Introduction of ePassports	07/02/2007	Case
ICT_07	DEFRA: A progress update in resolving the difficulties in administering the Single Payment Scheme in England	12/12/2007	Progress Report
ICT_08	The Procurement of the National Roads Telecommunications Services	04/04/2008	Case
ICT_09_1	The National Programme for IT in the NHS: Progress since 2006	16/05/2008	Case
ICT_09_2	The National Programme for IT in the NHS: Progress since 2006_Project Progress Reports	16/05/2008	Progress Report
ICT_10	Shared services in the Department for Transport and its agencies	23/05/2008	Case
ICT_11	Ministry of Defence: The Defence Information Infrastructure	04/07/2008	Case
ICT_12	Department for Work and Pensions: Information Technology Programmes	24/11/2008	Case
ICT_13	Memorandum for Work and Pensions Committee: Information Technology Programmes	24/11/2008	(= ICT_12)
ICT_14	Administration of the Crown Court	06/03/2009	Policy
ICT_15	The National Offender Management Information System	12/03/2009	Case
ICT_16	The BBC's management of strategic contracts with the private sector	18/03/2009	Policy
ICT_17	Innovation across central government	26/03/2009	Policy
ICT_18	Report of the C&AG on the 2008-09 Resource Accounts of the Ministry of Defence	20/07/2009	Auditing Report

ICT_19	A second progress update on the administration of the Single Payment Scheme by the Rural Payments Agency	15/10/2009	Progress Report
ICT_20	Memorandum to the House of Commons Communities and Local Government Committee: FiReControl project	09/02/2010	Case
ICT_21	Assurance for high risk projects	03/06/2010	Policy
ICT_22	HMRC: The efficiency of National Insurance administration	30/06/2010	Policy
ICT_23	Central government's use of consultants and interims	14/10/2010	Policy
ICT_24	The BBC's management of its Digital Media Initiative	01/02/2011	Case
ICT_25	Information and Communications Technology in government. Landscape Review	17/02/2011	Policy
ICT_26	Department for Environment, Food and Rural Affairs: Geographic information strategy	12/07/2011	Policy
ICT_27	NAO Review: A snapshot of the Government's ICT profession in 2011	25/10/2011	Policy
ICT_28	Improving the delivery of animal health and welfare services through the Business Reform Programme	18/07/2012	Case
ICT_29	Governance for Agile delivery	25/07/2012	Policy
ICT_30	A snapshot of the use of Agile delivery in central government	25/09/2012	Policy
ICT_31	The impact of government's ICT savings initiatives	23/01/2013	Policy
ICT_32	The UK cyber security strategy: Landscape review	12/02/2013	Policy
ICT_33	Digital Britain 2: Putting users at the heart of government's digital services	28/03/2013	Policy
ICT_34	Review of the final benefits statement for programmes previously managed under the National Programme for IT in the NHS	06/06/2013	Case
ICT_35	Case Study: DWP The Pension service – The impact of legacy ICT	05/08/2013	Legacy IT Svc
ICT_36	Case Study: OFT Consumer credit licensing service – The impact of legacy ICT	05/08/2013	Legacy IT Svc
ICT_37	Case Study: NHS Prescription services – The impact of legacy ICT	05/08/2013	Legacy IT Svc
ICT_38	Case Study: HMRC VAT Services – The impact of legacy ICT	05/08/2013	Legacy IT Svc
ICT_39	Managing the risks of legacy ICT to public service delivery	11/09/2013	Policy

Table 5-11: Final set of 15 NAO reports (Stage 2)

Doc Code	Title	Publish Date	Reference	Case Code
ICT_02	Department of Health: The National Programme for IT in the NHS	16/06/2006	NAO, 2006d	C-01
ICT_09_1	The National Programme for IT in the NHS: Progress since 2006	16/05/2008	NAO, 2008d	C-01
ICT_34	Review of the final benefits statement for programmes previously managed under the National Programme for IT in the NHS	06/06/2013	NAO, 2013b	C-01
ICT_03	Child Support Agency – implementation of the child support reforms	30/06/2006	NAO, 2006a	C-02
ICT_04	The delays in administering the 2005 Single Payment Scheme in England	18/10/2006	NAO, 2006e	C-03
ICT_06	Identity and Passport Service: Introduction of ePassports	07/02/2007	NAO, 2007	C-04
ICT_08	The Procurement of the National Roads Telecommunications Services	04/04/2008	NAO, 2008e	C-05
ICT_10	Shared services in the Department for Transport and its agencies	23/05/2008	NAO, 2008c	C-06
ICT_11	Ministry of Defence: The Defence Information Infrastructure	04/07/2008	NAO, 2008b	C-07
ICT_12	Department for Work and Pensions: Information Technology Programmes	24/11/2008	NAO, 2008a	C-08 - C-12
ICT_15	The National Offender Management Information System	12/03/2009	NAO, 2009b	C-13
ICT_20	Memorandum to the House of Commons Communities and Local Government Committee: FiReControl project	09/02/2010	NAO, 2010	C-14
ICT_24	The BBC's management of its Digital Media Initiative	01/02/2011	NAO, 2011c	C-15
ICT_28	Improving the delivery of animal health and welfare services through the Business Reform Programme	18/07/2012	NAO, 2012b	C-16
ICT_05_2	Delivering successful IT-enabled business change: Case studies of success	17/11/2006	NAO, 2006c	C-17 - C-31

5.4.3 Data Coding and Analysis

In brief, the data coding and analysis procedure works as follows. There are mainly five stages for data coding: data extraction, node creation, hierarchical structuralisation, data error correction and analysis. The data coding process of this study can be regarded as partially borrowed from grounded theory, that is, the methodological approach including data coding, developing the data category of hierarchy and result interpretation (Charmaz, 2011). At the end of this section, an example of the data coding process will be provided to bring this stage alive.

Data Extraction

The first stage is to understand the key meanings of content data. Whole reports were extracted by using each ‘paragraph’ as a default unit of analysis, and each key meaning was identified by adopting an abductive approach (Van de Ven, 2007); the meaning of each paragraph was determined from the content to draw inferences from the original data. The procedure of reading a paragraph and catching key meanings was iteratively carried out.

Node Creation (Data Coding)

After that, as the second stage, each paragraph was grouped into certain nodes. Mostly, they were coded into one node, but a few sentences were also coded into two or more nodes if they had multiple implications. The nodes were created based on the identified meaning of each paragraph, and the names of nodes were determined by using the existing terminology in the reports (Mayring, 2000; Hsieh and Shannon, 2005). This stage was carried out iteratively until the current nodes covered the key meanings of whole paragraphs and the theoretical saturation point was reached.

Hierarchical Structuralisation

Third, the three-level data hierarchy was developed. The created nodes in the second stage were developed into a hierarchy model after categorising the nodes inductively

(Mayring, 2000); though only the three main nodes (level 0 nodes) were deductively created in response to the literature review, all of the sub-nodes that contain the coded data (level 1 and level 2 nodes) were inductively created and structuralised; this approach helps develop the hierarchy model derived from the original report data. The following explanation from Schreier (2012) emphasises the importance of inductive category development:

“Qualitative data collection is inductive in using open, non-directional measures. Qualitative data analysis is inductive by letting key categories and concepts emerge from the data”.

(Schreier, 2012, p. 25)

For example, the two nodes, ‘End user support’ and ‘Training & skill’, are categorised as issues of ‘HR & Organisation’. In this case, by accommodating their contextual meaning, the node ‘HR & Organisation’ contains the other two nodes as a higher level node. As a result, a three-level data hierarchy was developed; see section 6, Research Findings, for details. To improve the data quality and stabilise the structural consistency, the node creation and hierarchy development were also iteratively carried out. Then, the data were summarised using frequency counts of the number of paragraphs coded to each node.

Data Error Correction

After completing the data coding in the Nvivo program, data error correction and a validity check were conducted. In order to advance the data quality, two tasks were carried out. First, a few data errors (numerical values) were found due to the static report format and the functional limitations of Nvivo software. For instance, if one paragraph splits across two pages in the original report file, the Nvivo program recognises it as two paragraphs. For this reason, initially counted numbers had to be modified manually. As a result, more than 40 paragraphs were corrected during the data migration process from Nvivo data components to Microsoft Excel spreadsheets manually.

Second, one NAO report (document code: ICT_05_2) only outlines 15 UK projects without detailed information, whilst other reports cover one case specifically.

Occasionally, this kind of data imbalance can lead to a lack of data validity. To address this issue, data coding was performed twice, coding with 15 reports and 14 reports without the report, ICT_05_2. As a result, both data coding values have the same results with regard to the priority of importance amongst the data nodes, though there is a small change in the specific percentage rate. For example, the node ‘Organisation Management’ (node code: PM-3-0) was recorded at 40.06% and 31.91% at the first and second validation, respectively; the percentage values of coded paragraphs is different, but both are still the highest coded node. On the basis of this result, the report ICT_05_2 was included in the final data set for this study.

Analysis

As the final step of data collection and analysis, the hierarchy model and the quantified data were analysed further to enrich the quality of the results. Thus, the highly coded data nodes were chosen first, and the original textual data from those selected nodes were analysed more intensively to formulate the concept of each and to create a full understanding of each project context. This approach assumes that the highly coded node data are regarded as the most meaningful, influential and critical issue in the case of IS projects in the UK public sector. The initially quantified result will be described in the result section (6.2. Results), and the key findings from the qualitative analysis will be discussed in the finding section (6.3 Findings).

Example of Data Coding

This section provides an example of the data coding procedure by using a paragraph in the data set. The paragraph below is contained in the document, ICT_05_2: Delivering successful IT-enabled business change: Case studies of success:

“To ensure that the system met users’ needs, the Office of Government Commerce invited public sector organisations with an interest in using an eSourcing platform to contribute to its development. To strengthen commitment, the Office of Government Commerce formed special interest groups of potential users to examine different aspects of the sourcing cycle and to produce requirements that would enable BravoSolution to adapt its

service to the UK public sector. For example, one special interest group evaluated the various commercial software packages that would work with the BravoSolution system. Another group contributed to the potentially eighty or more different email messages that the system might need to communicate to sellers during a sourcing cycle”.

(NAO, 2006c)

The meaning of this paragraph can be abductively understood as containing the issues about the importance of system end user requirements collection and engagement (Stage 1: Data Extraction). In order to enter this paragraph in a certain node, the node, IS-4-2: End User Requirements & Engagement, is created and the paragraph is coded into the node (Stage 2: Node Creation). After repeating this process for the whole data set, various nodes are created with loads of data. For instance, another node has a similar context of organisational aspect, such as the nodes, IS-4-1: Customer Management and IS-4-3: End User Support. For this reason, these three nodes are categorised into the upper level node, IS-4-0: HR & Organisation (Stage 3: Hierarchical Structuralisation). This procedure is iteratively carried out to structuralise all the nodes, and the final hierarchy model is developed. As explained at the earlier section, the data error is corrected if it occurs. Then, finally, the project context of the contents in the highly coded node data are analysed in detail by going back to the original report.

In addition to this exemplary process, a sample node content is attached as an appendix; the whole content of the ‘Training & Skill’, ‘Testing (Incl. Pilot, Proof of Solution)’ and ‘Policy Change’ nodes are provided. Moreover, the sample of the coded paragraph (by each sub-node) will also be provided in sections 6.2.3, 6.2.4 and 6.2.5.

5.4.4 Developing Data Coding Framework with Nvivo Software

To carry out the qualitative data collection and analysis more efficiently, the Nvivo 9 software was adopted. In this section, the Nvivo data coding procedure from importing NAO reports to developing data hierarchy will be described. First, 40 initially collected reports were imported into the Nvivo program. Figure 5-3 shows

the list of imported reports (centre) and five categories (top-left) in the Sources tab. The numbers in the column 'Node' indicate the number of nodes where the contents of each report were coded. For example, the textual contents of document ICT_02 were coded into 39 nodes. The column 'Reference' means the number of paragraphs in each report. Again, for example, 116 paragraphs were coded in the ICT_02 report.

Figure 5-4 shows the way a paragraph is coded into the nodes in a coding frame. Data coding can be processed in two ways: coding at existing nodes or coding at new nodes. As this research follows an inductive content analysis approach, reading a paragraph, developing a node and coding into a node were iteratively carried out at the same time. After reading each paragraph by opening an imported report in Nvivo, the context of the paragraph was determined (abductive reasoning) and it was coded into a suitable node by creating a new node or by coding into an existing node. If a paragraph had multiple implications, the paragraph was coded into multiple nodes. Then, the numbers of the Node and References of the coded node are automatically updated after adding the data.

In Figure 5-5, the nodes data including the number of coded reports (sources) and paragraphs (references) are shown in the Nodes tab on the left. As also seen in Figure 5-5, every node is developed and categorised by the three levels of hierarchy. All the paragraphs from the NAO reports were coded into the lowest level nodes, and the root nodes and the middle nodes are super-ordinate concepts which cover the lowest nodes.

Content Analysis_Ver2_Final.nvp - NVivo

File Home Create External Data Analyze Explore Layout View

Look for: Search In 1. Case Find Now Clear Advanced Find X

Sources

- Internals
 - 1. Case
 - 2. Legacy IT Svc
 - 3. Policy
 - 4. Auditing Report
 - 5. Project Progress Report
 - 9. Suspended
- Externals
- Memos
- Framework Matrices

1. Case

Name	Nodes	References	Created On	Created By	Modified On	Modified By
ICT_02_Department of Health_ The National Programme for IT in the NHS	39	116	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_03_Child Support Agency - implementation of the child support reforms	37	174	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_04_The delays in administering the 2005 Single Payment Scheme in England	19	58	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_05_2_Delivering successful IT-enabled business change_Case Studies	48	324	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_06_Identity and Passport Service_ Introduction of ePassports	21	65	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_08_The Procurement of the National Roads Telecommunications Services	27	96	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_09_1_The National Programme for IT in the NHS_ Progress since 2006	41	165	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_10_Shared services in the Department for Transport and its agencies	30	115	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_11_Ministry of Defence_ The Defence Information Infrastructure	39	134	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_12_Department for Work and Pensions_ Information Technology Programmes	26	67	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_15_The National Offender Management Information System	35	103	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_20_Memorandum to the House of Commons Communities and Local Government Committee_ FiReControl project	23	57	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_24_The BBC's management of its Digital Media Initiative	26	86	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_28_Improving the delivery of animal health and welfare services through the Business Reform Programme	24	71	10/12/2013 01:42	JC	10/12/2013 01:42	JC
ICT_34_Review of the final benefits statement for programmes previously managed under the National Programme for IT in the	11	39	10/12/2013 01:42	JC	10/12/2013 01:42	JC

Sources Nodes Classifications Collections Queries Reports Models Folders

JC 15 Items

Figure 5-3: Importing NAO reports into the Nvivo program

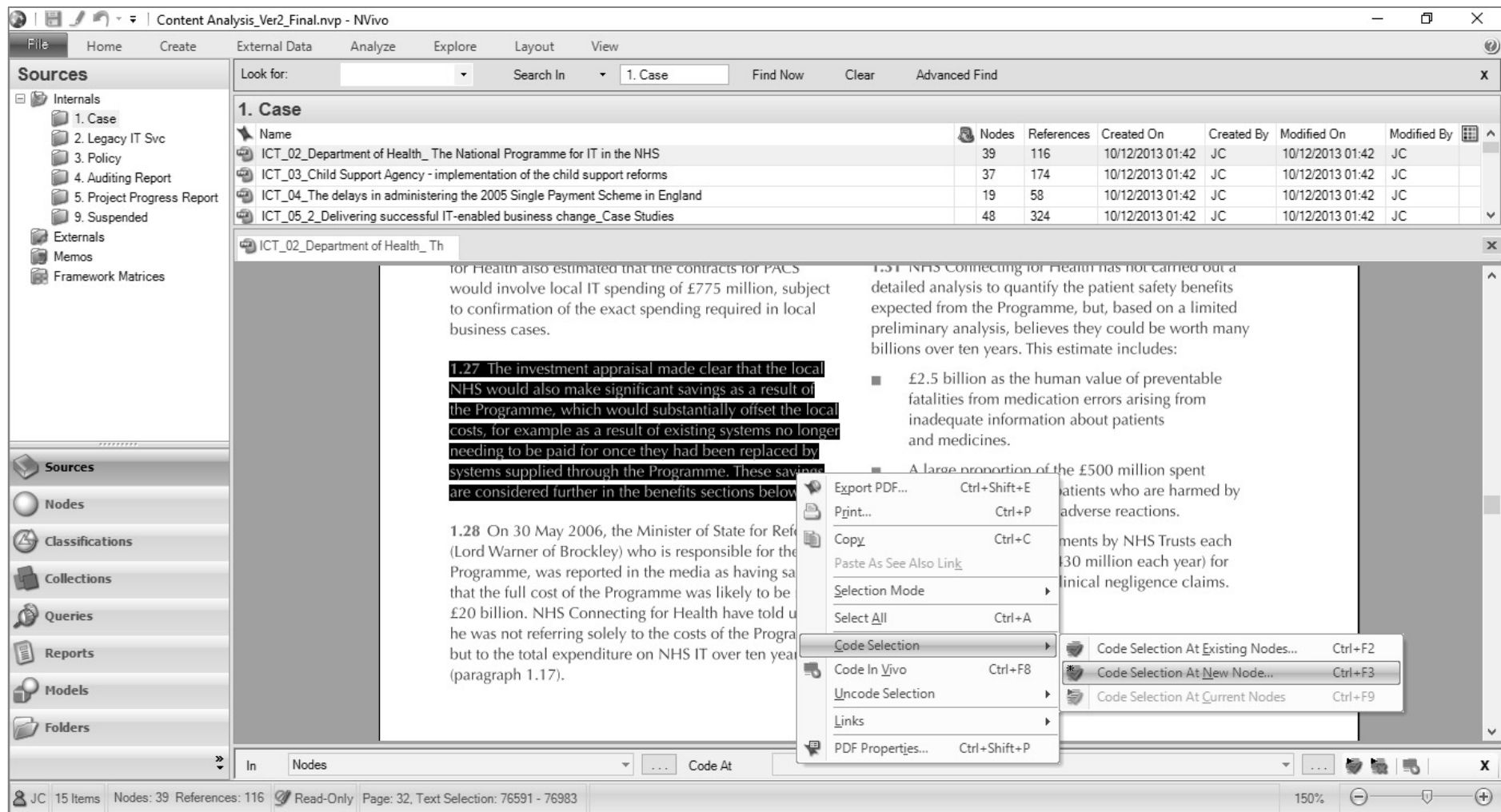


Figure 5-4: Data coding at new/existing nodes in Nvivo

Content Analysis_Ver2_Final.nvp - NVivo

File Home Create External Data Analyze Explore Layout View

Look for: Search In Nodes Find Now Clear Advanced Find

Nodes

- Nodes
- Relationships
- Node Matrices

Sources

Nodes

Classifications

Collections

Queries

Reports

Models

Folders

JC 201 Items

Name	Sources	References
1. PROJECT MANAGEMENT	0	0
2. INFORMATION SYSTEMS	0	0
3. PUBLIC SECTOR PROJECT	0	0
External Factors	0	0
Environmental Issues	2	2
Global Regulations	3	10
Government & Policy	0	0
Government Lead Business	7	13
Policy Change	3	7
Public Management Approach	0	0
Dual Management Approach; Centrally & Locally	4	6
Local Ownership	1	8
Management at National Level	2	4
Service Improvement vs Cost Minimisation	5	9
Public Private Partnership	0	0
Commercial Opportunity	2	6
Expertise & Best Practice in (out of) Public Sector	8	18
Public Private Partnership & Collaboration	7	19
4. CASE DESCRIPTION	0	0
C-01_National Programme for IT	0	0
Background	0	0
Devolved Governance Structure (Autonomous)	1	2
Non-centralised system (Data Sharing Problem)	1	3
Non-IT based works	1	1
Budget & Cost	3	9
Expenditure By Date	1	4

Figure 5-5: Data hierarchy and coded data in Nvivo

5.5 Key Information of 31 Selected Project Cases

Based on the 15 selected NAO reports, the project/programme information in the UK public sector was collected. Table 5-12 presents the general information about 31 project cases, including the title of the project/programme and relevant UK government bodies. The list of interlocked NAO reports for each case code is in Table 5-11 in the previous section. As shown in the table, many departments in the UK central government have been influenced by IS and relevant project/programmes, including the health, environment, transport, defence and broadcasting sectors.

The full details about each project, such as project description (background and objectives), project budget/costs and major deliverables (e.g. systems and functions), are summarised in Table 5-13. In addition to the list of owner organisation and the details on the whole projects, contractual information of each project such as outsourcing suppliers is provided in Table 5-14.

Table 5-12: 31 UK project cases in selected NAO reports

Case Code	Project Title	Organisation
C-01	National Programme for Information Technology	Department of Health
C-02	Child Support Reforms	Child Support Agency
C-03	Single Payment Scheme	Department for Environment, Food and Rural Affairs, and Rural Payments Agency
C-04	Identity and Passport Service	Home Office and Foreign and Commonwealth Office
C-05	National Roads Telecommunications Services	Highways Agency
C-06	Shared Services Transformation Programme	Department for Transport and its agencies
C-07	Defence Information Infrastructure Programme	Ministry of Defence
C-08 - C12	Department for Work and Pensions: IT Programmes	Department for Work and Pensions
C-13	National Offender Management Information System	National Offender Management Service
C-14	FiReControl project	Department for Communities and Local Government
C-15	BBC Digital Media Initiative	British Broadcasting Corporation
C-16	Business Reform Programme	Department for Environment, Food and Rural Affairs and the Animal Health and Veterinary Laboratories Agency
C-17	Payment Modernisation Programme	Department for Work and Pensions
C-18	Consumer Direct	Department of Trade and Industry
C-19	Businesslink.gov.uk	Department of Trade and Industry - Small Business Service
C-20	Eaga Partnership: Warm Front	Department for Environment, Food and Rural Affairs
C-21	Pension Credit	Department for Work and Pensions
C-22	Operator Self Service	Vehicle and Operator Services Agency
C-23	eSourcing Service - OGCBuying.solutions	Office of Government Commerce
C-24	Fishing Rod Licences	Environment Agency
C-25	Congestion Charging	Transport for London

C-26	Causeway	Northern Ireland Criminal Justice Directorate
C-27	Oyster® Card	Transport for London
C-28	Promise to resolution	Scottish Water
C-29	The National Transplant Database	UK Transplant
C-30	Introduction of Portfolio Management	Cambridgeshire County Council
C-31	Modernisation of Planning and Building Standards	City of Edinburgh Council

Table 5-13: Project case description

Code and Name	Overview and Timescale	Budget and Costs	Major Systems and Functions
C-01: National Programme for IT	A combination of national projects providing medical services to local NHS bodies for the whole of England, and of Local Service Providers (Timescale: 2002 - 2007 (The initial plan was to develop the systems by 2007, but failed to achieve it; the UK Government announced in September 2011 that it would dismantle the National Programme but keep the component parts in place with separate management and accountability structures))	Expected to cost £2.3 billion over three years, in June 2006 the total cost was estimated to be £12.4 billion over 10 years	<ul style="list-style-type: none"> ■ Electronic Transfer of Prescriptions ■ Choose & Book ■ Picture Archiving Communications System ■ NHS Care Records Service
C-02: Child Support Reforms	Systems to address the difficulty of complex maintenance calculation and the lack of effective enforcement action to encourage non-compliant parents	£427 million of contract to EDS	A new computer (CS2) and telephony system, to replace the existing computer system (CSCS)
C-03: Single payment scheme	The implementation of the single payment scheme involved the development of a range of systems and changes in working practices. to contribute to the difficulties in making accurate payments on time	<ul style="list-style-type: none"> ■ £75.8 million of estimated costs ■ £122.3 million of outturn 	<ul style="list-style-type: none"> ■ Rural Land/Customer Register ■ Claim to pay software ■ High volume data capture ■ Claims validation and inspection ■ Entitlements and end payments

C-04: Identity and Passport Service	Developing IT infrastructure and systems for electronic passports based on the changed international requirements and increasing concerns about passport fraud and forgery	£195 million of estimated marginal production costs	<ul style="list-style-type: none"> ■ ePassports ■ Reserve facility ■ Authentication by interview ■ Passport validation service ■ Personal identity process
C-05: National Roads Telecommunications Services	<ul style="list-style-type: none"> ■ Develop a new system of regional control centres to improve the reliability of the road network and to tackle the effects of traffic congestion through better traffic monitoring and by providing road users with traffic and travel information 	£345 million of project costs	<ul style="list-style-type: none"> ■ Motorway Incident Detection and Automatic Signalling ■ CCTV cameras ■ Automatic Number Plate Recognition (ANPR) camera projects ■ Motorway Access management ■ Speed Enforcement ■ Active traffic management schemes
C-06: Shared Services Transformation Programme	Provide centralised finance, human resources and payroll functions to approximately 23,000 staffs across its then six executive agencies, and central Department from a single Shared Service Centre	£55.4 million of estimated costs	<ul style="list-style-type: none"> ■ Build processes and the supporting IT system on the existing processes and systems in place in the Driver and Vehicle Licensing Agency and the Driving Standards Agency
C-07: Defence Information Infrastructure Programme	A single information infrastructure for the Services and the central Ministry of Defence to facilitate joint working between users on a common platform, and to enable 12 key defence change programmes	£5,854 million of forecast programme cost at contract	<ul style="list-style-type: none"> ■ DII infrastructure ■ Software and applications ■ A single point of contact for all queries

C-08 ~ C-12: Department for Work and Pensions: IT Programmes	<ul style="list-style-type: none"> ■ C-08: Development of the Employment and Support Allowance ■ C-09: Implementation of the Child Support Agency Operational Improvement Plan ■ C-10: Development of the Customer Information System ■ C-11: Introduction of a Central Payment System ■ C-12: The Pensions Transformation Programme 	£2,402 million of estimated costs, and estimated 46 per cent will be spent directly on IT	<ul style="list-style-type: none"> ■ The general policies adopted towards programme development including the Department's partnering arrangements and the progress it has made in renegotiating contracts with its main suppliers
C-13: National Offender Management Information System	Implement a single offender management IT system across prison and probation services to support a new way of working, and to replace existing prison inmate and local probation area offender case management systems with one integrated system	£513 million of estimated costs	<ul style="list-style-type: none"> ■ Reduce re-offending through end-to-end offender management ■ Introduce more assertive case management and integrate IT support ■ Improve means of monitoring compliance with National Standards
C-14: FiReControl project	Replacing 46 local Fire and Rescue Service control rooms with a resilient network of nine purpose built Regional Control Centres	£200 million of contract to EADS	<ul style="list-style-type: none"> ■ Firelink radio Network and Interface Network ■ Training materials for whole system
C-15: BBC Digital Media Initiative	<ul style="list-style-type: none"> ■ A new system to develop, create, share and manage video and audio content to reduce the time and cost of accessing and editing digital content ■ A system to support the recreation of media content and creative digital media archiving 	£133.6 million of estimated budget	<ul style="list-style-type: none"> ■ Systems to allow for the efficient transfer and use of digital files and to develop interactive online content, in new and more efficient ways

C-16: Business Reform Programme (Animal health and welfare svc)	<ul style="list-style-type: none"> ■ Improve ICT ■ Improve data quality and sharing ■ Understand costs and performance ■ Introduce more efficient ways of working ■ Reduce the burden of inspection 	<ul style="list-style-type: none"> ■ £107 million of cost ■ Increased budget of £123 million in June 2009 due to re-planning the ICT scope 	<ul style="list-style-type: none"> ■ Data cleanse ■ Customer contacts and registration ■ Document and records management ■ Work management ■ Combined tracings ■ Bovine tuberculosis ■ Exotic and remaining activities ■ Online direct payment
C-17: Payment Modernisation programme	Transforming the payment of benefits and pensions by paying entitlements directly into recipients' bank accounts (Timescale: October 2002 - May 2005)	£824 million of costs	
C-18: Consumer Direct	Providing consumers with a single access number to free advice when problems arise when dealing with traders (Timescale: January 2004 - February 2006)	£34 million of costs	<ul style="list-style-type: none"> ■ Customer helpline service ■ Call centre
C-19: Businesslink	A website providing support, advice and services to businesses in the UK (Timescale: June 2002 - April 2004)	c.£17 million of costs	<ul style="list-style-type: none"> ■ Single web portal
C-20: Eaga Partnership: Warm Front	A package of energy efficiency and heating measures to install or upgrade insulation and heating systems in their homes, for citizens at risk of fuel poverty UK (Timescale: January 2005 - June 2005)	c.£1 million of costs	<ul style="list-style-type: none"> ■ Infrastructure and system replacement
C-21: Pension Credit	Pension Credit was a new entitlement that had less rigorous means testing and replaced the Minimum Income Guarantee UK (Timescale: June 2002 - April 2003)	£297 million of costs	<ul style="list-style-type: none"> ■ Pension credit system (Part of Case 12)

C-22: Operator Self Service	Redesigning the business process and IT support for the vehicle licensing business (Timescale: December 1998 - March 2002 (Phase 1), December 2004 - November 2005 (Phase 2))	£9 million of costs	■ Heavy goods vehicle licences issuing system
C-23: eSourcing Service	Secure collaborative tools to conduct strategic procurement activities online, including tendering, negotiation, contract award and management (Timescale: 2001 - 2005)	£2 million of costs	■ Online collaborative tools
C-24: Fishing Rod Licences	A self-service system enabling customers to purchase fishing licences online at any time (Timescale: Six months from project inception in July 2000 to delivery)	£200,000 of costs	■ Online licensing system
C-25: Congestion Charging	A system to reduce traffic congestion in Central London by levying a flat rate fee upon drivers entering the congestion zone during the working day (Timescale: July 2000 - February 2003)	£234 million of costs	■ Congestion charging scheme
C-26: Causeway	Case management systems of the six main Northern Irish criminal justice agencies (Timescale: Spring 2002 - 2009, including a final phase)	£48 million of costs	■ Criminal Justice system
C-27: Oyster [®] Card	An electronic smartcard to renew, operate and maintain all the Transport Authority's infrastructure (Timescale: 1998 - 2005)	£40 million of costs	■ Oyster Card system ■ Infrastructure
C-28: Promise to resolution	An integrated customer management and field service programme (Timescale: November 2002 - March 2006)	£14 million of costs	■ Customer relationship management ■ Customer contact centre ■ Work scheduling system

C-29: The National Transplant Database	Providing a fast and accurate matching system to enable organs to reach patients as soon as organs become available for transplant (Timescale: 1997)	Running costs part of the annual budget of c.£14 million (2005-06)	■ National Transplant Database
C-30: Portfolio Management	Transforming its governance structures following the introduction of portfolio management (Timescale: April 2005 - February 2006)	£90,000 of costs	■ Programme, portfolio and resource management systems
C-31: Modernisation of Planning and Building Standards	Modernising the Council's back office systems, processes and services, as part of its 'Smart City Programme' (Timescale: Early 2002 - August 2003)	N/A	■ Council's back office systems

Table 5-14: Contractual information of 31 UK project cases

Case Code	Project Title	Supplier Information
C-01	National Programme for Information Technology	The four principal suppliers are BT, Accenture, Fujitsu and CSC, supported by numerous others.
C-02	Child Support Reforms	A consortium of contractors led by Electronic Data Systems (EDS) on behalf of the Department as a Private Finance Initiative (PFI) contract. EDS was responsible for the technical design, development, technical testing, implementation and delivery of the CS2 system.
C-03	Single Payment Scheme	Accenture - main contractor
C-04	Identity and Passport Service	Security Printing and Systems Limited - main contractor
C-05	National Roads Telecommunications Services	Agency and GeneSYS signed a PPP contract; A consortium KHHD, comprising KPMG, Herbert Smith, Hyder Consulting and Detica Ltd (then known as the Smith Group)
C-06	Shared Services Transformation Programme	IBM - main contractor
C-07	Defence Information Infrastructure Programme	The Department let a contract with ATLAS, a consortium with EDS as the prime contractor, Fujitsu, EADS, General Dynamics and Logica CMG.
C-08 - C12	Department for Work and Pensions: IT Programmes	EDS, BT, Accenture and Siemens - main contractors
C-13	National Offender Management Information System	EDS - main contractor; Syscon- Software development
C-14	FiReControl project	European Aeronautic Defence and Space Company – main contractor
C-15	BBC Digital Media Initiative	Siemens provides technology services, (those formerly supplied by BBC Technology), such as provision and management of IT commodities, specialist technology projects and technological support for programme production.
C-16	Business Reform Programme	IBM - main contractor

C-17	Payment Modernisation Programme	EDS - back office system development; Atos Origin - communications infrastructure; Vertex - contact centre operation; PA Consulting Group - client support
C-18	Consumer Direct	Detica - IT architecture and design, project management; Sophron Partners - consultancy; Affiniti - telephony; various IT suppliers including Sigdev, Fujitsu, Knowledge Network, and Cardiff City Council. Each region chose its own partners for the implementation of its solution.
C-19	Businesslink.gov.uk	BT - web development and hosting; Opta - service launch; Sweet & Maxwell - web content
C-20	Eaga Partnership: Warm Front	Eaga Partnership
C-21	Pension Credit	EDS - system development; BT - communications infrastructure; Ventura - contact centre operation; PricewaterhouseCoopers (now IBM) - business consultancy
C-22	Operator Self Service	Hedra - change management; LogicaCMG - software application; Computacenter - infrastructure support
C-23	eSourcing Service - OGCbuying.solutions	BravoSolution - application and support
C-24	Fishing Rod Licences	SciSys - software
C-25	Congestion Charging	Deloitte - client-side IT and programme management support; Capita Plc - system development and operation; Initial - camera supply and installation; and Colt and BT - telecoms
C-26	Causeway	Fujitsu - system development
C-27	Oyster® Card	Transaction Systems Limited consortium led by EDS and Cubic Transport Systems, in conjunction with Fujitsu and WS Atkins
C-28	Promise to resolution	Oracle - software; Celerant - business change
C-29	The National Transplant Database	UK Transplant employs around 130 staff, 26 of whom are IT specialists. The vital importance of the reliability of the National Transplant Database and the need for it to

C-30	Introduction of Portfolio Management	<p>provide accurate and timely information at all times has led the Service to develop and maintain an in-house IT resource, rather than to rely on outside suppliers or contractors.</p> <p>£90,000 was provided by the Office of the Deputy Prime Minister (now the Department for Communities and Local Government) to fund staff time to develop the models and processes with a Reference Group of other interested Local Authorities and other bodies. In addition, Cambridgeshire County Council provided two to three staff for the duration of the project.</p>
C-31	Modernisation of Planning and Building Standards	BT - computer systems and software development and support

5.6 Summary

This chapter covered the applied research methodology, including the source of data analysis. In response to the literature review and resulting research questions, the selected research method, the data set and the analysis approach were compiled.

First, the research methods and trends in IS research were outlined. Diverse research approaches have been employed in IS studies. In particular, the statistical data on the analysis of applied IS methods show a lopsided tendency to use a survey method and a relative lack of the application of content analysis and qualitative methods (apart from the case study). Application of the content analysis method in this thesis will bring new insight for examining IS topics. In addition, to validate and clarify the adopted research method, previous research approaches to IS were briefly reviewed. The efficiency of CAQDAS for qualitative analysis was also pointed out.

Second, a content analysis method was introduced. By providing the history and research trend of content analysis, the methodological importance and key features were emphasised to justify the approach of this study. Moreover, two different data coding methods were also explained to provide the rationale for the decision to adopt the inductive approach.

In the third section, the source of data (National Audit Office Value-for-Money reports) and the procedure of data collection and analysis (data coding process) were explained in detail. This section is a key element in terms of research methodology to justify the methodological approach of this thesis and its suitability. The detailed information on how and what research data were collected and analysed were provided.

As the final section of this chapter, further information on the selected data set and UK project cases was summarised. All the case information such as project background, objectives, timescale, financial information (e.g. budget and costs), major systems, functions and key project deliverables were briefly summarised in this section.

To sum up, 15 NAO VfM reports covering 31 IS projects in the UK central government were chosen as the final data set. With respect to the data analysis, two stages were accomplished: (1) quantifying the textual data to develop the data

hierarchy and (2) case-oriented further analysis on the basis of the quantified data set. To increase the efficiency of data collection and analysis and to reduce the human error factors, the qualitative analysis software, Nvivo, was selected as a technical tool kit.

In chapter 6, the results and key findings will be explained, followed by chapter 7, Discussion.

CHAPTER 6. RESULTS AND FINDINGS

6.1 Chapter Overview

This chapter will demonstrate the results (section 6.2) and key findings (section 6.3). In this thesis, the term ‘result’ refers to the final data hierarchy and the quantified results from the coding in content analysis, and ‘finding’ refers to the key findings from case-oriented further analysis based on the quantified results. On the basis of the content analysis method and the additional qualitative analysis, textual data from 15 UK government reports were collected and analysed. During the analysis, the data from NAO reports were quantified to identify common management issues in the case of IS projects in the UK public sector. Then the original content data were investigated in detail in reference to the highly coded nodes in order to interpret the project cases and their contextual management situation; as explained in the methodology chapter, this thesis argues that more frequently mentioned issues in the NAO reports (highly coded data) are considered as relatively more critical to a project owner than other project management topics. Based on the interpretation, required owner dynamic capabilities were revealed.

In regard to the result explanation in section 6.2, overall data coding results will be summarised first. This will include the number of coded paragraphs and coding results by each NAO report. Second, the result set developed as a three-tier hierarchical model will be described, and the detailed analysis results will also be provided, emphasising the key issues in each data node (sections 6.2.3, 6.2.4 and 6.2.5). In the three main nodes (PM, IS and PS), 788 paragraphs were coded into 75 sub-nodes during the stage of initial quantification. Overall (including the two subsidiary nodes, CD and ET), 1,670 paragraphs were included into 201 sub-nodes in the final hierarchical model.

Section 6.3 highlights a few key findings, and these will be thoroughly reviewed in the following three sections: 6.3.1, Project Back-End Capabilities, 6.3.2, Project Front-End Capabilities and 6.3.3, Project Governance Capabilities.

On the basis of the interpreted data set, the first finding suggests a few project back-end capabilities as owner dynamic capabilities, such as training and knowledge transfer. Thus, this thesis reveals the contextual relevance between the context of dynamic capabilities and a project owner’s capabilities; it is suggested that the

project back-end capabilities enhance the efficiency of maximising post-implementation benefits.

This thesis does not emphasise the importance of back-end capabilities only. The key finding highlights that the back-end capabilities (owner dynamic capabilities) can accelerate the successful delivery of project benefits by reinforcing the front-end capabilities. In this regard, the second finding reminds us of the value of project front-end capabilities by stressing the importance of an organisational approach to dealing with IS projects. Similar to previous studies on project capabilities, the result echoes the necessity of engaging a project owner and having contract/commercial management capabilities as the owner of implemented IS.

As the last key finding, section 6.3.3 will demonstrate the fundamental importance of a consistent governance structure through project management. By providing examples of UK project cases, this section will point out the significance of project governance structure and its management.

In accordance with the three research questions, the results section will provide answers to research question 1. Then the findings section will respond to research questions 2 and 3. As a reminder, the research questions are: RQ1 - What are the common issues and difficulties in managing IS projects in the UK public sector? RQ2 - Which dynamic capabilities are required by a project owner for IS projects in the public sector? RQ3 - How can owner dynamic capabilities contribute to realising post-implementation benefits of IS projects in the public sector?

6.2 Results

6.2.1 Coding Results: By Reports

Overall, 1,670 paragraphs in 15 NAO reports were coded into 201 sub-nodes in the final data set; as explained in the methodology chapter, a paragraph is the unit of analysis. Table 6-1 summarises the data coding results from the 15 reports. The table presents the document codes, the titles of documents and the number of coded nodes/paragraphs. In document ICT_02, for example, 116 paragraphs (of 1,670 paragraphs) were coded into 39 nodes (of 201 sub-nodes) by analysing the document.

Most reports contain approximately 100 paragraphs that analyse one or two project cases. On average, one report is composed of 96.14 paragraphs, with the exception of document ICT_05_2, which contains 324 paragraphs. Unlike the other documents, this report explores 15 UK project cases (of 31 cases in total) in one document. This results in the unusually large numbers. In terms of coded data node, the paragraphs in one report were coded into 29.73 nodes on average. The entire hierarchical model will be described in detail in section, 6.2.2 Coding Results: Hierarchical Data Model.

Table 6-1: Coded nodes and paragraphs by 15 NAO reports

Doc Code	Title	Nodes	Paragraphs
ICT_02	Department of Health: The National Programme for IT in the NHS	39	116
ICT_09_1	The National Programme for IT in the NHS: Progress since 2006	41	165
ICT_34	Review of the final benefits statement for programmes previously managed under the National Programme for IT in the NHS	11	39
ICT_03	Child Support Agency – implementation of the child support reforms	37	174
ICT_04	The delays in administering the 2005 Single Payment Scheme in England	19	58
ICT_06	Identity and Passport Service: Introduction of ePassports	21	65
ICT_08	The Procurement of the National Roads Telecommunications Services	27	96
ICT_10	Shared services in the Department for Transport and its agencies	30	115
ICT_11	Ministry of Defence: The Defence Information Infrastructure	39	134
ICT_12	Department for Work and Pensions: Information Technology Programmes	26	67
ICT_15	The National Offender Management Information System	35	103
ICT_20	Memorandum to the House of Commons Communities and Local Government Committee: FiReControl project	23	57
ICT_24	The BBC's management of its Digital Media Initiative	26	86
ICT_28	Improving the delivery of animal health and welfare services through the Business Reform Programme	24	71
ICT_05_2	Delivering successful IT-enabled business change: Case studies of success	48	324

6.2.2 Coding Results: Hierarchical Data Model

The hierarchical model developed in this thesis has three main nodes and two subsidiary nodes. The three main nodes are Project Management (PM), Information Systems (IS), and Public Sector (PS); see details in Tables 6-4, 6-11 and 6-17. The two subsidiary nodes are Case Description (CD) and Et cetera (ET); see details in Tables 6-2 and 6-3. Each node contains three tiered sub-nodes (levels 0, 1 and 2), but only the node CD has four tiers due to the complexity and quantity of contents.

As explained in the data coding and analysis section in the methodology chapter, the titles of nodes were abductively determined based on the context of the data (Hsieh and Shannon, 2005; Van de Ven, 2007). Specifically, the titles of the three main nodes were given based on the literature review structure; three main nodes were deductively created in response to the literature review. The titles of two subsidiary nodes were created instinctively (e.g. Case Description, Et Cetera). Apart from the five main and subsidiary node titles, all sub-node titles were developed inductively in order to improve inductive model construction (Mayring, 2000); thus, the entire hierarchy follows what the original data imply.

As the final outcome, 1,670 paragraphs in the 15 NAO reports were coded into 201 sub-nodes; in the three main nodes (PM, IS and PS), 788 paragraphs were coded into 75 nodes. The node Project Management engages the main issues occurring in managing projects in UK public IS projects (section 6.2.3, Main Node 1: Project Management). The node Information Systems involves managerial key points in the IS environment (section 6.2.4, Main Node 2: Information Systems). The node Public Sector deals with the key features of business patterns in the public sector compared with the private sector (section 6.2.5, Main Node 3: Public Sector).

Some contents in nodes PM and IS are similar. For example, both PM-3-0: Organisation Management and IS-4-0: HR & Organisation cover organisational issues, such as PM-3-6: Stakeholder Involvement and IS-4-2: End User Requirements & Engagement. To ensure that the criteria of data coding are clear, the issues including IS aspects contained in the node IS and other project management issues without IS factors were coded into node PM. Table 6-2 summarises the information about the five nodes (top level) such as node code, node name, and coded nodes/paragraphs in the three main nodes.

Table 6-2: Coded nodes and paragraphs in three main nodes and two subsidiary nodes

Node Code	Node Name	Coded Paragraphs	Coded Paragraphs (%)
PM-0-0	Project Management	337	42.76%
IS-0-0	Information Systems	353	44.79%
PS-0-0	Public Sector	98	12.43%
CD-0-0	Case Description	N/A	N/A
ET-0-0	ETC	N/A	N/A

In addition to the three main nodes (PM, IS, PS), there are two subsidiary nodes, CD and ET. Node CD comprises descriptive information including background, objective, budget, cost and schedule of the 31 projects. Due to the contextual characteristics, this node is developed with a four-tier hierarchy, and the contents are categorised by each project. Table 6-3 shows the structure of node CD.

Node ET is composed of miscellaneous paragraphs such as a foreword. As node ET contains only 11 paragraphs, there is no sub-structure in this node.

The coded data in the subsidiary nodes CD and ET were excluded from the data analysis and used to understand the general project information. However, a few paragraphs in the subsidiary nodes were also coded into the main nodes PM, IS and PS if they contained important contextual implications. In the next section, the detailed results of the three main nodes (PM, IS and PS) will be provided.

Table 6-3: Structure of node Case Description

Node CD. Case Description (Level 0)		
Level 1	Level 2	Level 3
C-01_National Programme for IT	Background	Devolved Governance Structure (Autonomous) Non-centralised System (Data Sharing Problem) Non-IT-based Works
	Budget & Cost	Expenditure by Date Local Expenditure National Expenditure
	General Information	Contract Organisational Structure Scale & Size
	Objectives & Deliverables Progress & Benefit	Detailed Care Record Financial Benefit Summary Care Record
C-02_Child Support Reforms	Background	IT Improvement before the Programme Operational Efficiency Reducing a Large Backlog of Unprocessed Cases
	Budget & Cost	
	General Information	Agency Contract Enforcement to Debtors Financial Data Schedule

	Objectives & Deliverables	
	Progress & Benefit	Go-live with Known Defects
C-03_Single payment scheme	Background	Quality Assurance
		EU Regulations
		Performance Delays in Payment
	Budget & Cost	
	Contract	
	Objectives & Deliverables	
	Progress & Benefit	
C-04_Identity and Passport Service	Background	Data Protection
		International Standards & Requirements
		Passport & Population
	Budget & Cost	
	Contract	
	Objectives & Deliverables	
	Progress & Benefit	
	Schedule	
C-05_National Roads Telecommunications Services	Background	Change of Business Focus
		Current Traffic Status
		Government's New Role
		Market Awareness
		Need for Digital Telecommunication
		Infrastructure
	Budget & Cost	
	Contract	

C-06_Shared Services Transformation Programme	Objectives & Deliverables Progress & Benefit Background Budget & Cost General Information	Contract Financial Data Governance Structure Outline Business Case Schedule
C-07_Defence Information Infrastructure Programme	Objectives & Deliverables Progress & Benefit Background Budget & Cost Contract Further Improvement Plan Objectives & Deliverables Progress & Benefit	
*C-08_Employment and Support Allowance		
*C-09_Child Support Agency Operational Improvement [AFTER C-02]		
*C-10_Customer Information System		
*C-11_Central Payment System [PART of C-17]		
*C-12_Pensions Transformation Programme		
C-13_National Offender Management Information System	Background Budget & Cost Contract	

	Objectives & Deliverables
	Progress & Benefits
C-14_FiReControl Project	Background
	Budget & Cost
	Contract
	Objectives & Deliverables
	Progress & Benefit
C-15_BBC Digital Media Initiative	Background
	Budget & Cost
	Contract
	Objectives & Deliverables
	Progress & Benefit
C-16_Business Reform Programme; Animal Health and Welfare Service	Background
	Budget & Cost
	Objectives & Deliverables
	Progress & Benefit
*C-17_Payment Modernisation programme	
*C-18_Consumer Direct	
*C-19_Businesslink.gov.uk	
*C-20_Eaga Partnership_Warm Front	
*C-21_Pension Credit (Part of C-12)	
*C-22_Operator Self Service	
*C-23_eSourcing Service	
*C-24_Fishing Rod Licences	
*C-25_Congestion Charging	

*C-26_Causeway

*C-27_Oyster Card

*C-28_Promise to Resolution

*C-29_The National Transplant Database

*C-30_Introduction of Portfolio Management

*C-31_Modernisation of Planning and Building Standards

* For the nodes C-08 to C-12 and C-17 to C-31, sub-nodes are not created as the amount of coded data is small (average: 9.95 paragraphs per node).

6.2.3 Main Node 1: Project Management

Summarised Result of Node, Project Management

Three hundred thirty-seven paragraphs were coded to the Project Management node, broken down into 6 nodes (level-1) and 26 sub-nodes (level-2) in the PM node. Amongst the diverse issues in IS projects in the UK public sector, only the contents related to general project management topics were selected for coding to this node (e.g. contract, planning, quality, risk management). To create a clear contextual difference from the IS node, the PM topics covering IS factors (such as technology, software and data management) were coded into the IS node.

One hundred thirty-five paragraphs were coded into the node Organisation Management as the most frequently occurring (40.06%) in the PM node. Most reports mention the significance of organisation management and relevant issues. This can be explained because most UK IS projects discussed in the NAO reports emphasise organisational values, including the importance of governance structure, managerial responsibility and stakeholder involvement. As the second highest value, the majority of reports also depicts the changeability of project planning (68 paragraphs; 20.18%) and quality management (59 paragraphs; 17.51%). These two nodes include (1) the change of cost, schedule, scope, personnel and contract and (2) performance management, fall-back plan and reviewing/monitoring, respectively. These results (planning/managing organisations, change and quality) echo the importance of traditional project management disciplines that highlight a project supplier's significant management factors.

In contrast to the importance of organisational and managerial aspects, node Contract Management was regarded as relatively less important (14.24%). This node includes major contractual issues such as supplier management (8.61%), pricing (1.48%) and sub-contracts (2.08%). This result demonstrates empirically the opposite viewpoint of classic analyses that contractual/commercial management capabilities are tacitly recognised as the major portion of the project owner's capability (NAO, 2006c, 2011b, 2012a, 2013c; Pryke and Smyth, 2006). From a project owner's perspective, this can be interpreted to mean that organisational management capabilities as well as contractual capabilities should be stressed to make post-implementation benefits

feasible as dynamic capabilities. Furthermore, risk/conflict management issues were also coded in the PM node (13 paragraphs; 3.86%).

Table 6-4 portrays the overall coding result of the PM node. This is followed by an explanation of each sub-node and linked UK IS project cases.

Table 6-4: Data hierarchy - Project Management node

Code	Nodes (Level 0, 1 & 2)	Report	Unit	Unit (%)
PM-0-0	PROJECT MANAGEMENT		337	100%
PM-1-0	Contract Management		48	14.24%
PM-1-1	Pricing	3	5	1.48%
PM-1-2	Roll-out & Close-out	5	7	2.08%
PM-1-3	Sub-contract	4	7	2.08%
PM-1-4	Supplier Management (incl. Negotiation)	8	29	8.61%
PM-2-0	Management Approach		14	4.15%
PM-2-1	Methodology	4	10	2.97%
PM-2-2	Programme & Inter-project Management Perspective	2	4	1.19%
PM-3-0	Organisation Management		135	40.06%
PM-3-1	Communication	8	19	5.64%
PM-3-2	Governing Structure, Process & Staffing	9	31	9.20%
PM-3-3	Leadership	4	7	2.08%
PM-3-4	Responsibility & Ownership	10	29	8.61%
PM-3-5	Senior-level Engagement	3	12	3.56%
PM-3-6	Stakeholder Involvement	12	37	10.98%
PM-4-0	Planning & Change Management		68	20.18%
PM-4-1	[General] Planning & Change Management	4	8	2.37%
PM-4-2	Costing Change & Control	6	11	3.26%
PM-4-3	Organisational & Personnel Change	8	10	2.97%
PM-4-4	Requirement & Contractual Change	7	15	4.45%
PM-4-5	Schedule Management	4	9	2.67%
PM-4-6	Scope Creep	6	8	2.37%

PM-4-7	Uncertainty around the Estimated Benefits	4	7	2.08%
PM-5-0	Quality Management		59	17.51%
PM-5-1	[General] Quality Management	2	3	0.89%
PM-5-2	Consistency for Operational Works	6	8	2.37%
PM-5-3	Fall-back Plan	3	6	1.78%
PM-5-4	Performance Management	9	23	6.82%
PM-5-5	Reporting & Documentation	8	9	2.67%
PM-5-6	Reviewing & Monitoring	7	10	2.97%
PM-6-0	Risk Management		13	3.86%
PM-6-1	Risk & Conflict Management	8	13	3.86%

PM-1-0: Contract Management

This node covers contract management issues in IS projects in the UK public sector. Due to a lack of internal capabilities in public organisations, all of the IS development projects in the data set were inevitably outsourced through the contract. Amongst the diversity related to the management of IS outsourcing project, four key issues were found, and they are categorised by four sub-nodes: Pricing, Roll-out & Close-out, Sub-contract and Supplier Management. Linked project cases (Table 6-5) and a description of each sub-node are provided; a sample of a coded paragraph is also provided for a better understanding.

Table 6-5: Contract Management node and linked project cases (PM-1-0)

Code	Nodes	Unit (%)	* Coded Project Cases
PM-1-0	Contract Management	14.24%	
PM-1-1	Pricing	1.48%	C-05, 07; 15
PM-1-2	Roll-out & Close-out	2.08%	C-01, 05, 07, 17
PM-1-3	Sub-contract	2.08%	C-01, 10, 14, 15
PM-1-4	Supplier Management (incl. Negotiation)	8.61%	C-01, 05, 07, 13, 14, 15, 17, 19, 21, 22, 23, 25, 26

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PM-1-1 (Pricing): Pricing is related to a project owner's decision regarding how to establish the price of the major components of a project. Based on a project owner's business strategies, cost database and market knowledge, payment structure and the way of pricing (e.g. item-by-item pricing) are determined. Regarding this, the UK government's major pricing issues and constraints in its IS projects are explained in this node. A sample of a coded paragraph in this node is as follows:

“Before submitting its investment case for the Programme to the BBC Trust, the BBC Executive asked external consultants to advise it on whether the Siemens price was competitive. The consultants concluded that open competition could have generated a better price, but that any savings (which were not quantified) would likely be offset by the cost of having to integrate

the new system with the Siemens-run BBC network and delays in securing benefits” (NAO, 2011c).

PM-1-2. Roll-out & Close-out: This section contains the project information about the project closing activities and relevant strategies in the UK IS projects. Not only the implementation of IS but also project completion is key to delivering a successful project. In particular, the data migration from legacy systems to newly implemented systems is critical to prepare a project owner’s operation after a project. In this node, diverse management issues in the final stage of the project were portrayed, including mitigating implementation problems, project acceptance criteria, contract finalization and the deployment of new systems. A sample of a coded paragraph in this node is as follows:

“Fixed Rollout Methodology. The difficulties described above generally tended to lengthen the implementation process beyond the 38 weeks allotted in the Fixed Rollout Methodology. However, in 2005 and 2006, there was no robust process in place to reschedule work at a site once delays had occurred. In some cases, subcontractors continued to arrive at sites in accordance with the original timetable even though it had ceased to be relevant. It was difficult to escalate problems for resolution higher in the management chain because of the small number of project managers employed by ATLAS” (NAO, 2008b).

PM-1-3. Sub-contract: Due to the features of IS ecosystems, an IS project is carried out based on contracts between a project owner and multiple project suppliers. This node covers the sub-contract issues between project contractors and sub-contractors such as sub-contractor management policies, the integration of contracts and their quality assurance. A sample of a coded paragraph in this node is as follows:

“The Department’s contractual arrangements with Accenture aimed to encourage close working with other suppliers where necessary through agreement that neither party would seek remedies from the other for delays in delivery within sensible tolerances” (NAO, 2008a).

PM-1-4. Supplier Management: This part involves the largest amount of issues in the Contract Management node. Supplier Management is one of most frequently occurring management factors in a project management field. In particular, suitable supplier management activities can strengthen the successful delivery of a project to a project owner. The issues concerned with how to build collaborative relationships with suppliers are mainly covered in this node. A sample of a coded paragraph in this node is as follows:

“As well as transferring financial and delivery risk to its prime contractors, NHS Connecting for Health has taken positive action to ensure the contractors are managing their tasks well. Its intrusive but supportive approach to the management of its suppliers is not common in the public sector. This approach covers both the prime contractors, and the several hundred subcontractors working for them. The approach adopted by the then Lord Chancellor’s Department with its LIBRA project is an example of a project where a Department failed to take decisive action where a supplier did not deliver what was required” (NAO, 2006d).

PM-2-0: Management Approach

This node includes general approaches and perspectives on dealing with IS projects. In the Management Approach node, the project management issues were categorised by two topics: Methodology and Programme & Inter-Project Management Perspective. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-6).

Table 6-6: Management Approach node and linked project cases (PM-2-0)

Code	Nodes	Unit (%)	*Coded Project Cases
PM-2-0	Management Approach	4.15%	
PM-2-1	Methodology	2.97%	C-01, 07, 13, 25, 30
PM-2-2	Programme & Inter-Project Management Perspective	1.19%	C-07, 17, 24, 30

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PM-2-1. Methodology: Applying an appropriate project management methodology is important to secure stable management of projects. As explained in the literature review, public sector organisations tend to rely on formalized principles and guidelines due to a lack of project management capability. In the case of the UK public sector, the PRINCE2 model is a frequently adopted methodological approach. The advantages and disadvantages of using the methodology are explained in this node to facilitate the strategic planning and resource allocation of the UK central government. A sample of a coded paragraph in this node is as follows:

“As a first step to improve strategic planning and resource allocation, the Corporate Project Office introduced new programme management arrangements. With the support of the Council’s directors, related projects were consolidated into programmes and to strengthen senior management oversight, new governance structures were set up using PRINCE2™ and Managing Successful Programmes (MSP) methodology” (NAO, 2006c).

PM-2-2. Programme & Inter-Project Management Perspective: This part includes the issues related to a multiple-projects environment. In general, two or more projects are executed and managed in any organisation at the same time. If those projects are associated each other with the same aims of business directivity, integrated management capability is a key to maximise benefits from the projects. In this node, the approach to project, programme and portfolio management is included. A sample of a coded paragraph in this node is as follows:

“The Department decided not to change the Programme schedule because of the timetables of other dependent business change programmes, and because ATLAS agreed that it would be able to set up and start to deliver within the compressed time period” (NAO, 2008b).

PM-3-0: Organisation Management

The Organisation Management node contains the human resource factors within both individual and organisational perspectives. This node is the largest of all the PM nodes. The coded data were categorised into six sub-nodes: Communication;

Governing Structure, Process & Staffing; Leadership; Responsibility & Ownership; Senior Level Engagement and Stakeholder Involvement. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-7).

Table 6-7: Organisation Management node and linked project cases (PM-3-0)

Code	Nodes	Unit (%)	* Coded Project Cases
PM-3-0	Organisation Management	40.06%	
PM-3-1	Communication	5.64%	C-01, 03, 06, 07, 14, 16, 17, 18, 19, 21, 22, 23
PM-3-2	Governing Structure, Process & Staffing	9.20%	C-01, 02, 07, 08, 13, 14, 16, 17, 22, 25, 30, 31
PM-3-3	Leadership	2.08%	C-01, 06, 13, 19, 25
PM-3-4	Responsibility & Ownership	8.61%	C-01, 02, 05, 06, 10, 13, 14, 16, 19, 21, 26, 27, 31
PM-3-5	Senior Level Engagement	3.56%	C-07, 14, 17, 20, 21, 26, 27, 30
PM-3-6	Stakeholder Involvement	10.98%	C-01, 03, 04, 05, 06, 07, 08, 13, 14, 15, 17, 18, 19, 20, 21, 25, 27

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PM-3-1. Communication: The coded data in this category highlight the importance of communication capability in managing projects. Difficulty of communication in and across project teams is still a continual concern in most project organisations. Communication plans, various communication conflicts and the lessons learnt are contained in this node. A sample of a coded paragraph in this node is as follows:

“NHS Connecting for Health is aware of the importance of effective communications with staff. Although direct responsibility lies with local NHS units, NHS Connecting for Health provides a comprehensive website and publishes numerous leaflets as well as comprehensive information packs for local use” (NAO, 2006d).

PM-3-2. Governing Structure, Process & Staffing: Developing and managing an appropriate governance structure is the key element in this node. The importance of the governance approach, including staffing, strategic management and process control, is emphasised to maximise the efficiency of project management. A sample of a coded paragraph in this node is as follows:

“The Programme’s complexity and the number of agencies and business units involved called for a robust governance structure with top management scrutiny and oversight. To achieve this, the Programme Board was situated between the Department’s Efficiency Board, chaired by the Permanent Secretary, and the Programme’s Steering Committee chaired by the Payment Modernisation Programme Director” (NAO, 2006c).

PM-3-3. Leadership: This node relates to the importance of individual leadership. The value of the successful creation of a collaborative environment, based on the project/programme leader’s leadership, is highlighted in the coded reports in this section. A sample of a coded paragraph in this node is as follows:

“QinetiQ also observed that the agency had adopted strong and forceful programme leadership, and employed high calibre people. These factors contributed to the agency having a strong team dynamic and feeling a strong sense of ultimate purpose” (NAO, 2006d).

PM-3-4. Responsibility & Ownership: Similar to the value of leadership, the importance of individual responsibility and ownership is also emphasised in this node. Ownership is a frequently highlighted management aspect in a project management environment. The lessons learnt and collected from managing IS projects are explained to point out the significance of high-level commitment. A sample of a coded paragraph in this node is as follows:

“The division of responsibility between the Programme Board and the Driver and Vehicle Licensing Agency weakened reporting and accountability and slowed communications between the central Department, the Agency and contractors. For example, contractors working on the

Programme told us that it was often difficult to resolve issues as they received inadequate or insufficient guidance; they also felt that the consensual approach to decision making slowed and complicated delivery” (NAO, 2008c).

PM-3-5. Senior Level Engagement: This node is about the managerial benefits of engaging senior-level managers/directors in a project owner’s organisation. For example, projects/programmes sponsored and led by senior management’s strong commitment can ensure the successful delivery of project deliverables and potential benefits. A sample of a coded paragraph in this node is as follows:

“The programme was sponsored and led by senior management. This ensured it was assigned the appropriate priority as its initial objectives had to be achieved within six months, a deadline set by the Department for Environment, Food and Rural Affairs (Defra)” (NAO, 2006c).

PM-3-6. Stakeholder Involvement: This topic is revealed as the biggest issue in the Organisation Management node. This part conveys the importance of project stakeholders’ strong commitment. This has a contextual similarity to the Senior-Level Engagement node. In addition to the senior-level aspect, the value of project stakeholders is pointed out in this node. A sample of a coded paragraph in this node is as follows:

“The need for strong stakeholder management was also identified as key to the success of the regional implementations. The first region to implement the service used Hedra, a change management specialist, to assist with the development of a structured stakeholder and communications plan. The stakeholder plan identified how influential a particular group was and their level of awareness of the project. This analysis was used to plan engagement with individual groups by identifying stakeholders that were concerned about the project. For example, front line trading standards staff were worried that they would either have no job or that their job would change beyond all recognition” (NAO, 2006c).

PM-4-0: Planning & Change Management

This data set covers the management issues related to project planning and its changeability. In general, a project is affected by diverse change issues. In the NAO reports, seven major change factors were found in this node: General Planning & Change Management, Costing Change & Control, Organisational & Personnel Change, Requirement & Contractual Change, Schedule Management, Scope Creep and Uncertainty around the Estimated Benefits. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-8).

Table 6-8: Planning & Change Management node and linked project cases (PM-4-0)

Code	Nodes	Unit (%)	*Coded Project Cases
PM-4-0	Planning & Change Management	20.18%	
PM-4-1	[General] Planning & Change Management	2.37%	C-02, 07, 13, 15
PM-4-2	Costing Change & Control	3.26%	C-01, 05, 06, 07, 13, 15
PM-4-3	Organisational & Personnel Change	2.97%	C-01, 02, 06, 09, 13, 16, 23
PM-4-4	Requirement & Contractual Change	4.45%	C-01, 02, 05, 07, 11, 13, 14
PM-4-5	Schedule Management	2.67%	C-07, 13, 14, 15
PM-4-6	Scope Creep	2.37%	C-01, 02, 05, 10, 13, 25
PM-4-7	Uncertainty around the Estimated Benefits	2.08%	C-01, 04, 06

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PM-4-1. [General] Planning & Change Management: This involves the general management issues about a gap between project plan and change. For example, mitigating changes and relevant policies are explained. Moreover, the lack of certainty about how the changes can be managed is highlighted as a serious impediment. A sample of a coded paragraph in this node is as follows:

“A lack of certainty about how changes will be managed. The contract does not provide adequate guidance on how change will be managed. This has

the impact that later Change Control Notes would have been difficult to interpret in the context of the overall contract” (NAO, 2006a).

PM-4-2. Costing Change & Control: This node contains the issues about cost change in UK IS projects. The actual experience of project changes is explained, such as why the cost changes occurred, how the changes were influenced and how the changes were resolved. A sample of coded paragraph in this node is as follows:

“Costing Change. ATLAS has been slow to provide the Department with costs for change requests, including updated rollout schedules. It has never met the contracted timescales to cost change, although the Department agrees that for complex changes these timescales are challenging. In such cases, the Department agrees a specific date with ATLAS, but these revised deadlines are not met in the majority of cases. Consequently, the Department has agreed to proceed with some changes without knowing the full cost, but has agreed a set liability with ATLAS to allow work to commence. The Department and ATLAS have established a joint team to improve the timeliness of costing Requests for Change” (NAO, 2008b).

PM-4-3. Organisational & Personnel Change: The data in this section describe the project change issues related to human resources. During a project life cycle, continual individual and organisational changes arise. Both individual and organisational changes and their impact on project management performance are emphasised in this node. A sample of a coded paragraph in this node is as follows:

“The changes in personnel have also strengthened the skills and expertise of the implementation team and senior management in the Shared Service Centre. The Department told us that it is developing a succession plan to mitigate the risk of losing knowledge and expertise vital to completing the Programme when individuals’ contracts end” (NAO, 2008c).

PM-4-4. Requirement & Contractual Change: This part covers change in project requirements and contracts. A project is initiated by the contract between a project

supplier and an owner, and the requirement analysis is carried out before the IS implementation. However, it is common for the requirements to continuously change even during the middle of the project life cycle and this is influenced by the project contract. Managing contractual change is highlighted as a key project capability for a project owner. A sample of a coded paragraph in this node is as follows:

“Changes to requirements. In addition to the change to the electronic document and record management requirement described above, there has been difficulty with changes to software requirements, for example, directory structures” (NAO, 2008b).

PM-4-5. Schedule Management: Another frequent change issue in a project management field involves the schedule. The required capabilities for managing a schedule and schedule changes are explained based on the experience in UK IS projects. A sample of a coded paragraph in this node is as follows:

“From March 2008, one month into the contract, the BBC was aware that delivery of the first key milestone in November 2008 was likely to be delayed by three months (although it anticipated this was only a temporary delay). The BBC and Siemens worked together to get delivery of the Programme back on track” (NAO, 2011c).

PM-4-6. Scope Creep: The data in this category emphasise the importance of project scoping and its change. Amongst another project change issues (e.g. budget, personnel, schedule), a requirements change can be a major trigger for scope creep. This node deals with the change in project scope and its management. A sample of a coded paragraph in this node is as follows:

“One of the generic risks to projects being successfully delivered is the addition of new or expanded projects to the original scope, known as ‘scope creep’” (NAO, 2006d).

PM-4-7. Uncertainty around the Estimated Benefits: A project owner’s major aim is to realise operational benefits from projects. Many IS projects in the UK public

sector have experienced the difficulty of realising project benefits. The reports point out the uncertainty of benefits estimations from IS projects. A sample of a coded paragraph in this node is as follows:

“The Department has not quantified the degree of uncertainty around the estimated benefits, and the benefits statement does not include a range of estimates based on a statistical assessment of uncertainty. It is possible to use statistical techniques to quantify sampling uncertainty if samples are designed and selected in advance to achieve this outcome. However, this was not the case here. Individual programme teams extrapolated on the basis of returns already received, which may not be representative of all trusts. It would not be possible for the Department now to produce an estimate of uncertainty without re-performing the benefits assessment exercise with appropriately designed samples” (NAO, 2013b).

PM-5-0: Quality Management

This section addresses the quality issues involved in managing IS projects, such as quality assurance, performance monitoring and contingency plan. The content data from the NAO reports were categorised by six factors: General Quality Management, Consistency for Operational Works, Fallback Plan, Performance Management, Reporting & Documentation and Reviewing & Monitoring. This node is the third largest node after Organisation Management (1st) and Planning & Change Management (2nd). This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-9).

Table 6-9: Quality Management node and linked project cases (PM-5-0)

Code	Nodes	Unit (%)	*Coded Project Cases
PM-5-0	Quality Management	17.51%	
PM-5-1	[General] Quality Management	0.89%	C-07, 14
PM-5-2	Consistency for Operational Works	2.37%	C-01, 02, 04, 05, 06, 07
PM-5-3	Fall-back Plan	1.78%	C-05, 14, 15
PM-5-4	Performance Management	6.82%	C-01, 04, 06, 07, 13, 14,

			20, 25
PM-5-5	Reporting & Documentation	2.67%	C-01, 02, 03, 05, 07, 13, 14, 30
PM-5-6	Reviewing & Monitoring	2.97%	C-02, 06, 07, 08, 13, 14, 23

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PM-5-1. [General] Quality Management: The coded data in this node emphasise the significance of project quality management in a general perspective. By providing the approach to quality planning, assurance and control from the actual UK project cases, the success and failure factors of project quality management are introduced. A sample of a coded paragraph in this node is as follows:

“ATLAS also undertook to improve the quality of its surveying and design work at sites, reducing the proportion of designs that need to be resubmitted for assurance” (NAO, 2008b).

PM-5-2. Consistency for Operational Works: A few reports highlight the requirements for consistent quality management from a project stage to operations. As explained in the literature review, the deliverable of IS project must be managed and maintained consistently during and after a project. This part points out the necessity of a permanent approach to managing the new IS. A sample of a coded paragraph in this node is as follows:

“Improved links with operations - Planning carried out more closely with operations’ staff than had previously been the case” (NAO, 2006a).

PM-5-3. Fallback Plan: With respect to project quality assurance, a thoroughly prepared fall-back plan and execution are essential to deliver a project of satisfactory quality to a project owner. This node contains the experience of developing and managing fall-back plans in IS projects in the UK public sector. A sample of a coded paragraph in this node is as follows:

“The procurement team did not prepare a detailed fallback plan in the event that the PPP procurement foundered. The Agency decided to take the associated risk for two reasons. The first was confidence that a deal with one of the bidders was likely even though the team knew that LINK was uncompetitive and knew there was a risk of upward price adjustments by GeneSYS in the later stages of the competition” (NAO, 2008e).

PM-5-4. Performance Management: Managing project performance is a critical factor for a project owner to ensure achieving a project owner’s requirements. The relationship between a benefits realisation plan and key performance indicators is explained in this node. A sample of a coded paragraph in this node is as follows:

“Suppliers who fail to meet agreed levels of service accrue performance deductions, and have to pay into an escrow account amounts depending on the severity of the performance failure and its repetition. If a supplier rectifies its failure for the following three months, the performance deductions are refunded, with interest. Otherwise NHS Connecting for Health is entitled to keep the money” (NAO, 2006d).

PM-5-5. Reporting & Documentation: This part highlights the importance of documentation during a project. It is generally believed that reporting and documentation are essential to manage project data and to capture lessons learnt. At the same time, however, the NAO reports indicate the tendency towards a lack of effort in project documentation. A sample of a coded paragraph in this node is as follows:

“The Department did not provide ATLAS with all the necessary documentation, such as licences and descriptions of codes, to allow some applications to move through the factory in a timely fashion. In some cases, ATLAS has helped the Department to source documentation for no additional payment” (NAO, 2008b).

PM-5-6. Reviewing & Monitoring: The context of coded data in this node is closely connected with performance reporting and management. In addition to the importance of general performance management, this node specifies how project data and quality are reported and managed during a project life cycle. A sample of a coded paragraph in this node is as follows:

“Independent review and assurance: The programme was subject to review by the Office of Government and Commerce Gateway team and by the Department’s Risk Assurance Division. Further ad hoc assurance reviews were carried out by others including the Department’s advisers, Cap Gemini” (NAO, 2008a).

PM-6-0: Risk Management

This category covers the risks and conflicts in managing IS projects. Diverse project risks exist across the whole project life cycle. On the basis of experience from the UK IS project cases, the ways to manage risks and conflicts are coded in this node. This is followed by the description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-10).

Table 6-10: Risk Management node and linked project cases (PM-6-0)

Code	Nodes	Unit (%)	*Coded Project Cases
PM-6-0	Risk Management	3.86%	
PM-6-1	Risk and Conflict Management	3.86%	C-02, 03, 05, 07, 13, 15, 16, 17, 30

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PM-6-1. Risk & Conflict Management: As most of the data were coded on the basis of the specific context of contents, a general explanation of the project risk management approach is included in this node; if the data are related to the risk of going over budget, they are coded into the Costing Change & Control node. In this node, for example, a general description of the risk management process and relevant good practices is included. A sample of a coded paragraph in this node is as follows:

“Risk Management. In March 2006, changes were made to the risk management regime. The processes for gathering information about key risks have been improved, and the leaders of the Programme now take greater ownership of strategic risks” (NAO, 2008b).

6.2.4 Main Node 2: Information Systems

Summarised Result of Node, Information Systems

In brief, 353 paragraphs were coded into 5 nodes (level-1) and 20 sub-nodes (level-2) in the IS node. Amongst the diverse issues in IS projects in the UK public sector, the contents covering IS issues such as systems integration, data management, and software deployment were reviewed and coded.

In the node IS, ‘HR & Organisation’ was identified as the most frequent value (36.83%, 130 paragraphs were imported). This node covers organisational issues including ‘End user requirements & engagement’ (43 paragraphs; 12.18%), ‘End user support’ (26 paragraphs; 7.37%), ‘Training & Skill’ (26 paragraphs; 7.37%), ‘Customer management’ (18 paragraphs; 5.10%) and ‘Knowledge & Experience’ (17 paragraphs; 4.82%). Similar to the interim result from the PM node, the organisational values were also regarded as the most significant aspects of managing IS projects in the UK public sector. Note that the issues of ‘Training & skill’ and ‘Knowledge & experience’ were also emphasised in this node. Previous project management studies generally acknowledge that project back-end issues such as training and education have been less highlighted (Heeks and Bhatnagar, 1999; Cha, 2012). There are two probable reasons. First, classic project management theories and practice have tended to focus only on a project supplier’s management and execution concerns such as managing the project schedule, scope and budget. Second, the managerial aim of a project supplier is to deliver a successful project; operational issues including training belong to the sphere of the project owner. In particular, ‘Training’ is highly related to the context of dynamic capability and the continual connectivity between project and post-implementation. For these reasons, this can give rise to less research attention focussed on project back-end issues, and there is still a gap between managing project capabilities and realising operational benefits. Summing up, a project owner should have suitable training capabilities as well as

routine PM capabilities to realise project success (business benefits) (NAO, 2008d, 2015b).

The second most frequent value is ‘Technology’, which refers to the significance of technological issues such as software functionality and system integration. The node ‘Technology’ contains ‘System deployment & integration’ (34 paragraphs; 9.63%), ‘Software functionality’ (14 paragraphs; 3.97%), ‘Hardware & devices’ (11 paragraphs; 3.12%) and ‘System/process standardisation’ (7 paragraphs; 1.98%). It is an intriguing result that organisational issues are more commonly discussed than technological ones even in the IS nodes. In other words, the most significant aspect of managing projects is to manage human resources and the organisation rather than technological aspects.

In addition to the organisational and technological issues, data management issues were revealed as the third highest value amongst five nodes (51 paragraphs; 14.45%). With regard to managing IS, suitable data management has been a key agenda item for system managers, especially in the public sector. This covers data security, accessibility & ethics (31 paragraphs; 8.78%), data migration (11 paragraphs; 3.12%) and data quality (9 paragraphs; 2.55%). Furthermore, an IS project is recognised as a business/process change and not just the completion of a technological mission in 38 paragraphs examined.

Table 6-11 portrays the overall results of coded data in the IS node. This is followed by an explanation of each sub-node and linked UK IS project cases.

Table 6-11: Data hierarchy - Information Systems node

Code	Nodes (Level 0, 1 & 2)	Report	Unit	Unit (%)
IS-0-0	INFORMATION SYSTEMS		353	100%
IS-1-0	Context of Information Systems		60	17.00%
IS-1-1	Approach	7	12	3.40%
IS-1-2	Complexity & Uncertainty	6	10	2.83%
IS-1-3	IT as Business Process Change	11	38	10.76%
IS-2-0	Control & Support		40	11.33%
IS-2-1	On-Going System Support	4	5	1.42%
IS-2-2	System Failure Control	5	12	3.40%
IS-2-3	System Quality Management	2	4	1.13%
IS-2-4	Testing (Incl. Pilot, Proof of Solution)	7	19	5.38%
IS-3-0	Data Management		51	14.45%
IS-3-1	Data Migration	5	11	3.12%
IS-3-2	Data Quality	7	9	2.55%
IS-3-3	Data Security, Accessibility & Ethics	8	31	8.78%
IS-4-0	HR & Organisation		130	36.83%
IS-4-1	Customer Management	3	18	5.10%
IS-4-2	End User Requirements & Engagement	11	43	12.18%
IS-4-3	End User Support	7	26	7.37%
IS-4-4	Knowledge & Experience	4	17	4.82%
IS-4-5	Training & Skill	9	26	7.37%
IS-5-0	Technology		72	20.40%
IS-5-1	[General] Technology Management	2	6	1.70%
IS-5-2	Hardware & Devices	4	11	3.12%
IS-5-3	Software Functionality	6	14	3.97%
IS-5-4	System & Process Standardisation	6	7	1.98%
IS-5-5	System Deployment & Integration	7	34	9.63%

IS-1-0: Context of Information Systems

This node contains the key IS management issues in the UK projects in more general terms. An IS project has its own characteristics in comparison with other types of projects such as an infrastructure project with physical deliverables. In particular, the uncertainty of IS change and its relationship with business strategies are major distinctions. The data are categorised by three sub-nodes: Approach, Complexity & Uncertainty, and IT as Business Process Change. This is followed by the description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-12).

Table 6-12: Context of Information Systems node and linked project cases (IS-1-0)

Code	Nodes	Unit (%)	*Coded Project Cases
IS-1-0	Context of Information Systems	17.00%	
IS-1-1	Approach	3.40%	C-01, 06, 07, 12, 15, 16, 18, 27
IS-1-2	Complexity & Uncertainty	2.83%	C-01, 02, 07, 13, 17
IS-1-3	IT as Business Process Change	10.76%	C-01, 02, 03, 04, 06, 08, 12, 13, 15, 16, 17, 19, 21, 22, 24, 26, 28, 31

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

IS-1-1. Approach: The distinctive approach to dealing with an IS project is explained in this category. For example, the ways of managing IS project life cycle stages and a top-down/incremental approach are outlined in this node. A sample of a coded paragraph in this node is as follows:

“The Agency planned an incremental approach, implementing change in eight releases rather than all in one go as a ‘big bang’ approach. This was a realistic approach given the need for the Agency to balance resources between implementing a substantial change programme, while delivering day-to-day activities and maintaining readiness for an emergency at all times. On average, there is a suspected disease outbreak each week” (NAO, 2012b).

IS-1-2. Complexity & Uncertainty: The two main characteristics of IS projects, complexity and uncertainty, are coded. An IS project is generally carried out in a rapidly changing market environment, and the technology itself also shows a high level of progress. The coded data express a need to understand the complexity and uncertainty of IS project management. A sample of a coded paragraph in this node is as follows:

“The three Local Service Providers told us that the scale and complexity of the Programme made it extremely challenging and all have boosted their capacity since the start of the Programme, in part prompted by NHS Connecting for Health. For example, CSC has reinforced its team with people from its United States operations and BT has also transferred staff to enhance its programme management capability” (NAO, 2008d).

IS-1-3. IT as Business Process Change: This node covers the context of IS as business change and its significance. Many of the NAO reports argue that an IS project needs to be regarded as business process change, not technological change itself. A sample of a coded paragraph in this node is as follows:

“A key lesson from many unsuccessful IT projects in the past is that the NHS needs to see the Programme as a business change programme with clear goals and benefits rather than an IT project” (NAO, 2006d).

IS-2-0: Control & Support

The Control & Support node depicts the value of project control activities. To deal with critical changes and risks, project control and support activities are essential to secure the quality of a project. The context of data is similar to that in the Quality Management node, but this is more related to technological issues such as systems, software and data. Four types of project control issues were found in this node: On-Going System Support, System Failure Control, System Quality Management and Testing. This is followed by the description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-13).

Table 6-13: Control & Support node and linked project cases (IS-2-0)

Code	Nodes	Unit (%)	*Coded Project Cases
IS-2-0	Control & Support	11.33%	
IS-2-1	On-Going System Support	1.42%	C-01, 02, 06, 13
IS-2-2	System Failure Control	3.40%	C-01, 02, 03, 04, 05
IS-2-3	System Quality Management	1.13%	C-01, 02
IS-2-4	Testing (Incl. Pilot, Proof of Solution)	5.38%	C-01, 03, 06, 09, 11, 15, 16, 25, 26, 28

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

IS-2-1. On-Going System Support: This node emphasises the necessity of coherent system support activities during project stages and even in operation stages. In general, an IS project is incrementally deployed within a project life cycle (e.g. initiation, plan, analysis, design, implementation, testing, data migration, closing). The NAO reports point out that system support activities are required even after the system is implemented. A sample of a coded paragraph in this node is as follows:

“Once a new care records system has been deployed a great deal of ongoing effort is required to realise the benefits, and successful realisation depends on the technical performance of the system, the level of staff acceptance and the ongoing support provided” (NAO, 2008d).

IS-2-2. System Failure Control: Similar to the Fallback Plan node, controlling system failure is material to managing systems implementation and integration. The lessons learnt about how to control systems errors and failures are summarised in this category. A sample of a coded paragraph in this node is as follows:

“An ePassport remains a valid travel document even if the electronic chip fails. If failure is detected at border control, the holder will be issued with a letter advising them to contact the issuing authority. The Identity and Passport Service will examine any faulty ePassports returned to it and, where it concludes the chip unit contains a manufacturing fault, the ePassport will be replaced free of charge. In instances where the chip cannot

be read, secondary border control screening measures need to be in operation to maintain the increased security offered by the implementation of ePassports” (NAO, 2007).

IS-2-3. System Quality Management: In addition to the system failure control, it is mandatory to monitor whether or not the new system and its implementation processes achieve the planned goal. This part includes information on how the quality of system development project is managed. A sample of a coded paragraph in this node is as follows:

“A more robust assurance process – All future software releases to pass through the recognised assurance process. Since the introduction of CS2 the more significant software releases had been through the recognised assurance process, but smaller releases, maintenance releases and hot-fixes had not been subjected to the full assurance process. Up to March 2004 releases of telephony software had not had formal assurance processes applied to them” (NAO, 2006c).

IS-2-4. Testing (Incl. Pilot, Proof of Solution): Unlike other types of projects, testing of implemented systems is essential to synchronise the requirements of new systems. Carrying out the proof of solution activity is important before the implementation stage, and testing the developed system is also required to reach the planned level of system quality. The importance of system testing and the proof of solution are explained in this node. A sample of a coded paragraph in this node is as follows:

“Testing a paper-based version of the proposed business process with front-line staff proved that the system would work, identified potential improvements and secured staff support for the proposed business change” (NAO, 2006c).

IS-3-0: Data Management

The third node contains the UK project information with regard to IS data management. Data are core elements in managing IS project. The data-related issues

in the NAO report were categorised by three sub-nodes: Data Migration, Data Quality and Data Security, Accessibility & Ethics. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-14).

Table 6-14: Data Management node and linked project cases (IS-3-0)

Code	Nodes	Unit (%)	*Coded Project Cases
IS-3-0	Data Management	14.45%	
IS-3-1	Data Migration	3.12%	C-01, 02, 10, 13, 16
IS-3-2	Data Quality	2.55%	C-01, 02, 04, 13, 16, 29
IS-3-3	Data Security, Accessibility & Ethics	8.78%	C-01, 04, 06, 07, 10, 13, 16

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

IS-3-1. Data Migration: This node covers the key issues of data migration in IS projects in the UK public sector. After implementing new systems, the data in legacy systems must be moved to the new systems. Data migration activities require an accurate approach as data properties in two systems (legacy and new systems) are different, which can lead to frequent system errors. The management policies and solutions to address data/systems migration issues are explained. A sample of a coded paragraph in this node is as follows:

“In October 2003 a dry-run was carried out for the bulk migration planned for Spring 2004 to transfer to CS2 existing cases processed on the old computer system and convert assessments to new rules calculations. This confirmed the findings from the FELD review that prerequisites in terms of system and business stability had not yet been met and revealed a small but significant number of errors rendering the exercise unsuccessful. On this basis bulk migration was postponed and remains postponed” (NAO, 2006a).

IS-3-2. Data Quality: The information about the difficulties and concerns about data quality management is collected in this category. Data quality management and its

standardisation methods are introduced in this node. A sample of a coded paragraph in this node is as follows:

“The Agency has well-defined data standards based on Department or government standards where possible. Formal governance and change control arrangements are in place for the Agency’s data model, which sets out the definitions, formats and structure of the data required to support the Agency’s business. IBM is responsible for maintaining the model” (NAO, 2012b).

IS-3-3. Data Security, Accessibility & Ethics: As all of the data are stored and managed online, data security is a major concern in IS projects. This part contains the issues related to data security, accessibility and ethical considerations. A sample of a coded paragraph in this node is as follows:

“While the Department has strategic responsibility for security and information assurance, the Agency takes sensible steps to assess and manage information security risk. We found that there were appropriate policies, governance arrangements and risk management processes alongside a good level of staff education and awareness within the Agency” (NAO, 2012b).

IS-4-0: HR & Organisation

Similar to the PM node, this node includes the largest amount of NAO report data in the IS node. This covers organisational issues, including human resource management, in terms of IS and technologies. All the data were categorised by five topics: Customer Management, End User Requirements & Engagement, End User Support, Knowledge & Experience and Training & Skill. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-15).

Table 6-15: HR & Organisation node and linked project cases (IS-4-0)

Code	Nodes	Unit (%)	*Coded Project Cases
IS-4-0	HR & Organisation	36.83%	
IS-4-1	Customer Management	5.10%	C-02, 03, 24
IS-4-2	End User Requirements & Engagement	12.18%	C-01, 02, 06, 07, 08, 13, 14, 15, 16, 17, 21, 23, 27
IS-4-3	End User Support	7.37%	C-01, 02, 03, 12, 16, 17, 19, 23, 27, 30
IS-4-4	Knowledge & Experience	4.82%	C-07, 13, 15, 20, 21, 22, 23, 25, 27, 29, 31
IS-4-5	Training & Skill	7.37%	C-01, 02, 03, 06, 07, 08, 16, 23

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

IS-4-1. Customer Management: In this node, the contextual meaning of customer can be defined as the customer of a project owner (e.g. UK citizens). The concept is included in the coded data, and the importance of customer management during and after IS projects is emphasised by providing examples from the IS project cases in the UK public sector. A sample of a coded paragraph in this node is as follows:

“The difficulties with the implementation of the new system and subsequent delays in processing cases have contributed to a high level of complaints being made by the Agency’s customers. The Agency has a three tier system for handling complaints from customers. Unsatisfied complainants can escalate their complaint up through the tiers until a satisfactory resolution is achieved” (NAO, 2006a).

IS-4-2. End User Requirements & Engagement: This highlights the importance of end users’ engagement as a key role and responsibility of system end users. In addition, clearly defined project requirements are also emphasised as critical success factors in managing projects as a project owner. As system end users are *de facto* owners of the IS, their requirements and engagement are considered critical. A sample of a coded paragraph in this node is as follows:

“Clear understanding of users’ needs enabled TranSys and Transport for London to run a targeted marketing campaign to sell the benefits of the Oyster® card to potential users” (NAO, 2006c).

IS-4-3. End User Support: In contrast to the End User Requirements & Engagement node, this node points out the roles of a project supplier. The coded data give a general description of how system end users can be continuously supported during and after a project. A sample of a coded paragraph in this node is as follows:

“The application form for the single payment scheme proved difficult to understand and complete for some farmers, especially those who had not previously claimed any CAP payments. The guidance handbook was over 100 pages long and included technical phrases or words that some farmers found difficult to understand” (NAO, 2006e).

IS-4-4. Knowledge & Experience: This node highlights the significance of IS knowledge, project experience and their appropriate transfer from a supplier to an owner. Unlike previous project management studies that focus on a project supplier, the NAO reports point out the necessity of IS knowledge management. A sample of a coded paragraph in this node is as follows:

“Close working between Vehicle and Operator Services Agency staff and Hedra consultants throughout the business process design phase to ensure knowledge and skills interchange: Project terms of reference were created to ensure that the Hedra team subscribed to this expected behaviour. This required Hedra to consult with Agency staff throughout the study and to take all opportunities for collaboration” (NAO, 2006c).

IS-4-5. Training & Skill: Similar to the Knowledge & Experience node, this is also a unique finding in the data set. This node covers the issues related to IS user training and skill development to manage the new IS project deliverables appropriately. A sample of a coded paragraph in this node is as follows:

“Training was an important component of every deployment we examined and is essential for a Trust to operate as efficiently as possible in the period immediately following the deployment. As noted previously, delays to the deployment timetable can impede a smooth transition as the ‘go live’ date may be some time after staff have been trained in the new system. Some Trusts we visited needed to provide repeat or refresher training as a result of delays” (NAO, 2008d).

IS-5-0: Technology

Technological factors are unique features of IS projects and include hardware, software and electronic devices. The project management issues related to those technological elements are coded in this category. The coded NAO data set in this node was categorised by five aspects: General Technology Management, Hardware & Devices, Software Functionality, System & Process Standardisation and System Deployment & Integration. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-16).

Table 6-16: Technology node and linked project cases (IS-5-0)

Code	Nodes	Unit (%)	*Coded Project Cases
IS-5-0	Technology	20.40%	
IS-5-1	[General] Technology Management	1.70%	C-15, 21, 23, 28
IS-5-2	Hardware & Devices	3.12%	C-01, 04, 05, 07
IS-5-3	Software Functionality	3.97%	C-01, 02, 06, 07, 13, 21
IS-5-4	System & Process Standardisation	1.98%	C-01, 06, 07, 13, 16
IS-5-5	System Deployment & Integration	9.63%	C-01, 07, 08, 11, 12, 13, 15, 16, 21, 22, 23

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

IS-5-1. General Technology Management: In general, a project owner is less confident in dealing with technological issues than system suppliers. The data show that diverse technological uncertainties existed in managing IS projects in the UK

public sector. This node describes why technology is difficult and complex to manage as a project owner. A sample of a coded paragraph in this node is as follows:

“Using off-the-shelf technology allowed Scottish Water to quickly implement a proven workable solution and to achieve a faster return on investment” (NAO, 2006c).

IS-5-2. Hardware & Devices: This part contains project issues and required management capabilities related to IS hardware and devices. For example, managerial considerations to set up the space to install hardware facilities are described in this data set. A sample of a coded paragraph in this node is as follows:

“The Department now seeks to identify equipment and server rooms at sites as early as possible, even before the site has started formal preparations to receive DII. Planning permission can then be sought and building work can commence earlier” (NAO, 2008b).

IS-5-3. Software Functionality: In addition to hardware and device management, software is a key element in managing IS projects. Amongst the diverse software features, functionality is one of the main considerations in IS project management. A lack of clarity about functionality and planned/achieved requirements is outlined in the NAO reports. A sample of a coded paragraph in this node is as follows:

“A key factor in staff acceptance was the level of functionality provided by the new system relative to the Trust’s previous one. The care records systems that had been deployed to date in the Trusts we visited had limited clinical functionality. Although some Trusts now had more functionality, one Trust had replaced an elderly but fully integrated administration and clinical system with a new care records system and several non-integrated clinical systems; this change had a very negative impact on the Trust’s ability to engage clinical staff. Increased functionality is planned for later releases of the care records software” (NAO, 2008d).

IS-5-4. System & Process Standardisation: Standardisation is a critical factor in IS development as all users should deal with the system consistently without operational errors. The experience of the UK government's efforts on system and process standardisation is explained in this node. A sample of a coded paragraph in this node is as follows:

“Sometimes, even when all the necessary information for an application has been available, it has been technically difficult to make it compatible with the new DII system. This difficulty can be due to the age of the application or the language in which it is programmed” (NAO, 2008d).

IS-5-5. System Deployment & Integration: After finalising system planning, analysis and design, the actual procedure of system deployment and integration is carried out. This node contains the managerial issues related to deploying new systems during an IS project. A sample of a coded paragraph in this node is as follows:

“Deployment plans – the timing of system deployments must be agreed with Trust Boards and their Chief Executives, and in particular the decision that a Trust is ready to ‘go live’ lies solely with the Trust. This decision is especially sensitive because of the risks to patient care and the general operation of a Trust if a decision to go live were to be made prematurely” (NAO, 2008d).

6.2.5 Main Node 3: Public Sector

Summarised Result of Node, Public Sector

In brief, 98 paragraphs were coded into 4 nodes (level-1) and 11 sub-nodes (level-2) in the PS node. The report data were coded if a paragraph contained the key features of public sector business, such as the impact of government policy change and public private partnership. As all of the NAO reports are basically written from the perspective of a public sector organisation, a relatively small quantity of data was coded to this node rather than the PM and IS nodes.

In the node PS, several characteristics of public sector projects were found. First, a public private partnership was identified as a dominant issue in UK public IS projects (43.88% coded). Above all, the result shows that the collaboration between private/public sectors (19.39% coded) and the expertise and best practice from the private sector (18.37% coded) can also enhance the efficiency of managing government projects. Managing commercial opportunities as a project owner was also regarded as an important issue during IS projects in the public sector (6 paragraphs; 6.12%).

Second, the result points out the major influence of government policies on public sector projects (17.35% coded); 12.24% of paragraphs mentions 'Government driven business' and 5.10% highlights the impact of 'Policy change'. Thus, public projects will inevitably change due to the revocation of policy or political change.

Furthermore, such projects are highly influenced by external factors such as global standards and environmental regulations (12.24% coded). For instance, the standardisation of chip design and data formats was the key requirement of the UK's e-Passport project to make it conform to the requirements of the International Organization for Standardization and the European Union (NAO, 2007).

Table 6-17 portrays the overall coding result of the PS node. This is followed by an explanation of each sub-node and linked UK IS project cases.

Table 6-17: Data hierarchy - Public Sector node

Code	Nodes (Level 0, 1 & 2)	Report	Unit	Unit (%)
PS-0-0	PUBLIC SECTOR		98	100%
PS-1-0	External Factors		12	12.24%
PS-1-1	Environmental Issues	2	2	2.04%
PS-1-2	Global Regulations	3	10	10.20%
PS-2-0	Government & Policy		17	17.35%
PS-2-1	Government Driven Business	7	12	12.24%
PS-2-2	Policy Change	3	5	5.10%
PS-3-0	Public Management Approach		26	26.53%
PS-3-1	Dual Management Approach; Centrally & Locally	4	7	7.14%
PS-3-2	Local Ownership	1	8	8.16%
PS-3-3	Management at a National Level	2	3	3.06%
PS-3-4	Service Improvement vs. Cost Minimisation	5	8	8.16%
PS-4-0	Public Private Partnership		43	43.88%
PS-4-1	Commercial Opportunity	2	6	6.12%
PS-4-2	Expertise & Best Practice in (out of) Public Sector	8	18	18.37%
PS-4-3	Public Private Partnership & Collaboration	7	19	19.39%

PS-1-0: External Factors

Due to the uniqueness of public sector business, it is influenced by various external and environmental factors such as government policy and national/international regulations. The External Factors node comprises two sub-nodes: Environmental Issues and Global Regulations. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-18).

Table 6-18: External Factors node and linked project cases (PS-1-0)

Code	Nodes	Unit (%)	*Coded Project Cases
PS-1-0	External Factors	12.24%	
PS-1-1	Environmental Issues	2.04%	C-05, 07
PS-1-2	Global Regulations	10.20%	C-03, 04, 15

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PS-1-1. Environmental Issues: Not only a project issue itself but also the comprehensive understanding of the environment are triggers for delivering a successful public project. The NAO reports highlight this importance. For example, by understanding the environmental context of the UK defence environment, an appropriate defence estate can be selected for setting up its hardware and database facilities. A sample of a coded paragraph in this node is as follows:

“Environmental planning consents delayed commencement of GeneSYS’s cable laying activities particularly along the M3 motorway where it encountered dormice and other protected species. To recover time, the contractor increased resources used on the project, for example through additional working shifts” (NAO, 2008e).

PS-1-2. Global Regulations: This node contains the project issues related to global regulations. As the UK is a member nation of the European Union (EU), following EU laws and regulations is compulsory in UK public IS projects. Implementing the e-Passport system, for instance, is a representative project directly related to global regulations. A sample of a coded paragraph in this node is as follows:

“To ensure that UK citizens can travel freely, ePassports must conform to standards set by the International Organization for Standardization on the design of the chip and data formats, and by the International Civil Aviation Organization on the overall design and features of the ePassport, including the data and the security features protecting it” (NAO, 2007).

PS-2-0: Government & Policy

Public projects are driven by the government, and political decisions and change can influence most projects in the public sector. The coded data in this node point out UK government policies and their impact on IS project delivery. The issues were categorised by two elements: Government Lead Business and Policy Change. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-19).

Table 6-19: Government & Policy node and linked project cases (PS-2-0)

Code	Nodes	Unit (%)	*Coded Project Cases
PS-2-0	Government & Policy	17.35%	
PS-2-1	Government Driven Business	12.24%	C-01, 04, 13, 14, 15, 16, 27
PS-2-2	Policy Change	5.10%	C-01, 03, 04

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PS-2-1. Government Lead Business: In this node, how the UK government leads its IS projects and relevant considerations are summarised. On the basis of the characteristics of government projects, the UK government’s approval process and impact on the strategy of IS projects/programmes are provided. A sample of a coded paragraph in this node is as follows:

“The Programme continues to enable the Agency to meet wider departmental and government objectives such as better regulation, responsibility and cost sharing and the provision of a joined-up customer experience. The Programme is also aligned in part to the government’s 2011

ICT Strategy. For example, a single, core system in the Agency could integrate with other systems across the Department and its arm’s-length bodies” (NAO, 2012b).

PS-2-2. Policy Change: A number of policy, operational and other changes can occur during the procurement of public projects that lead to delays. This data set outlines which types of policy change have had an impact on the UK government’s IS projects and how they were handled. A sample of a coded paragraph in this node is as follows:

“The Department makes periodic changes to the organisational structure of the NHS, for example in July 2006 the number of Strategic Health Authorities was reduced from 28 to 10 and of Primary Care Trusts from 303 to 152. Such reconfigurations lead to changes in information requirements and the Programme needs to have the facility to reconfigure information so that it reflects new organisational boundaries” (NAO, 2008d).

PS-3-0: Public Management Approach

This part describes the UK government’s public management approach from a general perspective. Thus, the general characteristics of UK government projects and the geographic considerations of national-level IS project are explained. The NAO data in this node were categorised by four elements: Dual Management Approach (Centrally & Locally), Local Ownership, Management at a National Level and Service Improvement vs. Cost Minimisation. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-20).

Table 6-20: Public Management Approach node and linked project cases (PS-3-0)

Code	Nodes	Unit (%)	*Coded Project Cases
PS-3-0	Public Management Approach	26.53%	
PS-3-1	Dual Management Approach; Centrally & Locally	7.14%	C-01, 18

PS-3-2	Local Ownership	8.16%	C-01
PS-3-3	Management at a National Level	3.06%	C-01
PS-3-4	Service Improvement vs. Cost Minimisation	8.16%	C-01, 06, 12, 16

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PS-3-1. Dual Management Approach (Centrally & Locally): For the NPfIT project, the scale and scope of the project are huge, covering the entire medical systems in the UK mainland. Due to its complexity, the UK government must consider the most suitable way to manage the enormous systems. This node contains issues concerning whether the managerial roles of IS are centralised or decentralised by distributing the duties locally. A sample of a coded paragraph in this node is as follows:

“As has been set out in a number of past National Audit Office and Committee of Public Accounts reports, the NHS had a poor track record in procuring and delivering IT systems to improve patient care and, in the Department’s view, local procurement had offered poor value for money. To avoid these historical problems, the Department decided to pursue a dual policy of procuring large systems centrally; implementing them through Local Service Providers in conjunction with NHS Trusts, having left all local IT resources in place; and providing support for systems as they are implemented locally” (NAO, 2006d).

PS-3-2. Local Ownership: Similar to the dual management approach above, the coded data emphasise the importance of local ownership capabilities to facilitate locally distributed system development and management duties. A sample of a coded paragraph in this node is as follows:

“In October 2006 the Department initiated the ‘National Programme for IT Local Ownership Programme’, to strengthen local ownership and governance and re-position the Programme as part of mainstream NHS business, and in April 2007 accountability for implementing the Programme formally transferred to the local NHS” (NAO, 2008d).

PS-3-3. Management at a National Level: In contrast, this part contains the project and operations information in terms of management of national-level systems. The UK government has clarified the roles and responsibilities of IS implementation and management both locally and nationally. This node highlights the features of national-level management activities. A sample of a coded paragraph in this node is as follows:

“The Department also considered that central procurement was the only way to deliver an integrated national system, for example because of the difficulty of integrating large numbers of system components.” (NAO, 2006d).

PS-3-4. Service Improvement vs. Cost Minimisation: Public sector business has a clear difference to business in the private sector. Many of the NAO reports argue that the main aim of public business is to improve public services and to minimise management costs, whilst private sector organisations tend to focus on profit maximisation. The coded data show a balanced approach of the UK government between service improvement and cost minimisation. A sample of a coded paragraph in this node is as follows:

“The Department expects the Programme to generate substantial benefits for patients and the NHS. At the outset it sought to put a financial value on the expected benefits though, as the main aim was to improve services rather than reduce costs, it was not possible to do so in all cases, and there is therefore no baseline against which to assess the benefits that are in due course achieved” (NAO, 2008d).

PS-4-0: Public Private Partnership (PPP)

Due to a lack of resource capacity and technical knowledge, adopting PPP in UK government business has become a key issue in recent times. This section covers the PPP elements in IS projects in the UK public sector. The data were categorised by three sub-nodes: Commercial Opportunity, Expertise & Best Practice in (out of)

Public Sector and Public Private Partnership & Collaboration. This is followed by a description of sub-nodes with a sample of a coded paragraph and linked UK IS project cases (Table 6-21).

Table 6-21: Public Private Partnership node and linked project cases (PS-4-0)

Code	Nodes	Unit (%)	*Coded Project Cases
PS-4-0	Public Private Partnership	43.88%	
PS-4-1	Commercial Opportunity	6.12%	C-05, 15
PS-4-2	Expertise & Best Practice in (out of) Public Sector	18.37%	C-01, 02, 04, 07, 08, 14, 16, 23, 25, 26, 29
PS-4-3	Public Private Partnership & Collaboration	19.39%	C-05, 07, 08, 13, 14, 15, 19, 21, 22, 27

* The list of case codes/names can be found in Table 5-11: Final set of 15 NAO reports.

PS-4-1. Commercial Opportunity: Considering a public project as a commercial opportunity is a traditional approach for a project owner. The NAO reports also highlight the opportunity based on IS project deliverables. A sample of a coded paragraph in this node is as follows:

“The upgraded systems would meet the Agency’s expected future demand for telecommunications capacity and the Agency expected that there would be market interest in commercial exploitation of the improved assets” (NAO, 2008e).

PS-4-2. Expertise & Best Practice in (out of) Public Sector: The UK government has learnt IS-related expertise and best practices by carrying out a lot of IS projects. Building up the lessons learnt from the IS projects can benefit the management of future IS projects. This section addresses how IS project knowledge and best practices in/out of the public sector have been collected and utilised. A sample of a coded paragraph in this node is as follows:

“In addition to contracting out some of the debt collection activities the Agency is also seeking to improve its own debt collection and enforcement activity by drawing on external best practice. A further 600 staff are

expected to be trained in enforcement activities by early 2007 and the number of staff engaged in enforcement is expected to increase from 650 to over 2,000 by 2009” (NAO, 2006a).

PS-4-3. Public Private Partnership & Collaboration: The key element to achieve a successful PPP depends on the maturity level of collaboration between the private and public sectors. This node contains the information regarding how the UK government bodies have collaborated with private organisations to improve their project performance and management. A sample of a coded paragraph in this node is as follows:

“In pursuing a PPP, the Agency wanted to ensure that the price of the risk transfer was reasonable. It, therefore, checked to ensure that the cost of the PPP was no higher than the cost of a conventional procurement, adjusted for risk” (NAO, 2008e).

6.3 Findings

On the basis of coded textual data, data hierarchy and quantified ‘results’, specific examples of the capabilities will be suggested as the key ‘findings’ in this section. To carry out the case-oriented further analysis, the original report data from the highly coded nodes in the hierarchy were qualitatively examined in further to analyse the context of each project case. In the case of PM node, for example, the node ‘Organisation Management’ (PM-3-0) recorded as the most frequently coded node (40.06%). The actual project case issues from all of the sub-nodes such as ‘Stakeholder Management’, Responsibility & Ownership’ and ‘Governance Structure, Process & Staffing’ were narratively examined. In the case of IS node (IS-4-0), all sub-nodes of the node “HR & Organisation” were explored as it received 36.83% as the most frequent issue.

There are three sub-sections in this part. With respect to owner dynamic capabilities, first, ‘training and knowledge transfer’ capabilities will be introduced as project back-end capabilities in section 6.3.1. Second, project front-end capabilities such as ‘engagement of project owner’ will be explained in section 6.3.2. Third, project

governance capabilities to emphasise the managerial accountability through an IS project will be highlighted in section 6.3.3.

6.3.1 Project Back-End Capabilities

The research findings highlight the required dynamic capabilities for a project owner. The first key finding from the results concerns the importance of project back-end capabilities, such as training and skill development, in preparing an on-going strategy to share relevant knowledge and experience between project suppliers and owners. In particular, “the need for a mutual connectivity between the learning within the IS project team and the learning across the organization can be challenging because, to varying degrees, IS projects operate independently from the rest of the organization” (Wagner *et al.*, 2012, p. 259). The next section will provide a narrative explanation of project back-end capabilities (training and skill development and knowledge and experience transfer) through the UK project cases.

Training and Skill Development

This research focusses on the perspective of a project owner, and its result shows the importance of project back-end capabilities. Back-end capabilities have a unique difference from the front-end capabilities that have been emphasised in previous project capability studies (Morris, 1997; Davies and Brady, 2000; NAO, 2004a, 2004b; Morris, 2013; PMI, 2013). The key finding of this research is that back-end capabilities such as training and skill development can mean that a project owner’s major consideration is the value of operational benefits through successful delivery of the project. Thus, these efforts are related to the concept of dynamic capabilities (e.g. configuring existing capabilities or creating new capabilities).

In general, the main reasons for a project owner’s training are to overcome “insufficient skills in information technology, project management and procurement” (NAO, 2008c, 2015b). Especially, due to the characteristics of temporary project organisation and its changeability, suitable learning and skill development are critical to minimise a loss of expertise. In the delivery of the animal health and welfare

services programme (C-16; NAO, 2012b), for example, the government agency found capability gaps that arose from reducing reliance on the interim project staff and made an organised effort to increase staff skills in programme and project management:

“While the Agency has been reducing its reliance on interim staff, it recognises there are capability gaps in its current workforce. It is introducing learning and development activities to strengthen staff skills, specifically in programme and project management, and commercial management”.

(Business Reform Programme, C-16; NAO, 2012b)

In preparing for organisational change and its impact on capability gaps, an appropriate and sufficient training programme can contribute to operational performance after ‘go-live’. In addition, a training programme and its facilitation can also lead indirectly to a shortened schedule of project closing and system go-live:

“Training was an important component of every deployment we examined and is essential for a Trust to operate as efficiently as possible in the period immediately following the deployment. As noted previously, delays to the deployment timetable can impede a smooth transition as the ‘go live’ date may be some time after staff have been trained in the new system. Some Trusts we visited needed to provide repeat or refresher training as a result of delays”.

(NPfIT, C-01; NAO, 2008d)

In many project cases in the collected research data, the difficulties of training and its facilitation are highlighted (NAO, 2006a, 2006c, 2006d, 2008c, 2008d). In the NPfIT case (C-01), a level of staff unfamiliarity with the new systems was inevitable, which gave rise to the risk of operational performance after project closing. Regarding this, launching a training programme to increase staff familiarity was believed to enhance the staff’s system usability and their understanding of the new process, though some Trusts immediately hired additional experts to fix the urgent problems:

“Some Trusts we visited had identified savings arising from the deployment of the new systems, but there was also evidence of operational performance

declining immediately following a deployment. Some staff had not found the new care records systems intuitive to use and key processes such as booking a new patient into an outpatient clinic were taking much longer than they had previously. This had prompted some Trusts to take on additional staff to input or process data. However, Trusts considered that any negative impact would diminish as staff became more familiar with the systems and more records were entered, removing the need for staff to re-enter demographic and other basic details”.

(NPfIT, C-01; NAO, 2008d)

In order to facilitate a well-established training programme, four major factors are found in the result that must be considered in advance of launching training sessions.

First is the quality of both training contents and trainers for managing new systems (NAO, 2006d, 2008c, 2008d). Dissatisfaction with training programmes from a few NHS Trusts was expressed in the NHS’ NPfIT case (C-01). The project revealed a gap between the collected end users’ requirements during the project stage and the implemented systems after the project. This problematic concern triggered a gap between training contents and the actual system users’ specific configuration:

“Another common theme was the need for a training environment that was as close as possible to the ‘live’ system. Most of the Trusts visited expressed dissatisfaction with the generic training environment provided to them, which did not resemble their specific configuration, for example the structures of their outpatient clinics, which may vary from one Trust to another. Some staff were confused when the system went live as it looked different from the one they had trained on”.

(NPfIT, C-01; NAO, 2008d)

In addition to the training contents quality, the importance of the quality of trainers to deliver practical training in the workplace must be considered. By introducing the NHS localised policy of training incentives, local service providers were encouraged to provide effective training of trainers and to support staffs to work well:

“NHS Connecting for Health’s strategy requires suppliers to develop IT training to “train the trainers” and then to harness the training and

development resources and skills of the local NHS to deliver training in the workplace. Local Service Providers are incentivised to provide effective training of trainers and support for staff to work and use the new systems by being paid, in some part, on usage of the systems they are delivering”.

(NPfIT, C-01; NAO, 2006d)

Second, the effort to develop new culture with regard to new information systems is highlighted in the result as an essential aspect to achieve operational performance (NAO, 2006a, 2008d). The cultural agreement on the new IS can accelerate end users’ system usability and performance. In the NPfIT’s training programme, users were educated not only on technical skills but also on expected operational benefits to establish better understanding of the new systems. Thus, the overall aim of operational benefits depends on the level of staff acceptance and the on-going support provided as well as technical performance:

“Usage is increasing and since December 2007, 50 per cent of new outpatient appointments have been booked through Choose and Book. Utilisation rates vary considerably, however, with some Primary Care Trusts above 90 per cent and others below 20 per cent. One Trust we visited, which has one of the highest rates, attributed it to the fact that staff had gone out to meet GPs and provided one-to-one training and demonstrations to highlight the benefits of the system. Primary Care Trust staff were also providing ongoing support and advice to local GPs”.

(NPfIT, C-01; NAO, 2008d)

The third issue concerns the segmentation of trainee organisations. To strengthen the training programme, a differentiated approach for each organisation is necessary rather than a generic approach for all staff; the training can be more efficient if the roles/responsibilities of each staff member and organisation are reflected. In the NPfIT case, a training session was conducted to spread IT skills related to the new systems, and each staff member was trained based on people-specific roles. The training curriculum was mainly focussed on sharing practical knowledge and experience, including application software, the impact of technical change on the business process and the relevant experience of using computers. Below is an example:

“Training appeared to be more successful where it was tailored to reflect people’s specific roles, rather than generic to all staff. One Trust designed and delivered training in modules that recognised the Trust was responsible for several hospitals that operated in different ways and reflected the role differences between the hospital sites. It is also important to recognise that the new care records systems can result in more staff actively using the system than previously, and some Trusts also provided basic IT training to help staffs who were inexperienced in using IT”.

(NPfIT, C-01; NAO, 2008d)

Moreover, a training provider needs to recognise that training is a costly activity to any organisation. To avoid unnecessary training costs, the Child Support Reforms project team calculated the budget and cost of training and decided who needs training and who does not. Then, only caseworkers were trained in the new system, and the overseeing staffs of caseworkers were not included in the training sessions on how to use the system:

“In preparation for the new system going live the Agency initially trained 400 staff and a further 7,000 during the first year of operating CS2. Jobcentre Plus needed to train a much higher number of staff, 58,000, as a large number of applications are initiated when parents with care apply for income related benefits, although this was necessarily less comprehensive than the training for Child Support Agency staff. Up to October 2005, training staff to use the CS2 system had cost the Agency over £30 million. However, only caseworkers were given training in the new system, staff overseeing teams of caseworkers were not routinely offered training on how to use the new system”.

(Child Support Reforms, C-02; NAO, 2006a)

Incidentally, the manner in which training is provided is also regarded as important. In the training policy of case C-08, system end users’ opinions were collected in advance of delivering the IS training, showing that they prefer face-to-face training over online training. Based on their opinion, the training was carried out to minimise the learning decay and to fit in with business pressures:

“Emphasis on learning and development: The project has involved the training of around 10,000 staff to operate the new arrangements and IT. A further 5,000 staff will be trained in the next year. The training was scheduled so that it could be as close to programme launch as possible to prevent learning decay but also to fit in with business pressures such as peak times of work or holiday periods. Much of the training was carried out face to face by experienced in house staff rather than, for example, by e-learning, as this was preferred by many staff and was considered by the team to be more effective”.

(Business Reform Programme, C-16; NAO, 2012b)

Knowledge and Experience Transfer

Owner-vendor knowledge transfer is a critical aspect for realising knowledge utilisation (Dalton, 2007; Williams, 2011). The result of this thesis points out the importance of knowledge transfer and its impact on a project owner’s business.

In most UK project cases, the effort to share project and technical IS knowledge has been emphasised even after project close-out. To prepare a suitable framework for knowledge transfer, organisational complexity and changeability should be understood. For example, a project is generally managed by temporary teams including the members of suppliers, owners and third parties. After completing a project, the individuals return to their original positions. Subsequently, a loss of expertise is inevitable and an on-going approach for minimising the loss of shared knowledge about the new systems is important.

In the National Offender Management Information System project, the project owner organisation recognised the significance of being an “intelligent client” with sufficient capabilities, such as technical knowledge and supplier relationship management. The report highlights that a lack of technical knowledge about new systems due to a less productive relationship with a project supplier leads to the delay of project performance:

“In our 2006 report *Delivering Successful IT-enabled Business Change*, we identified the need for organisations to act as intelligent clients. We found

organisations were more likely to succeed if they formed productive relationships with suppliers, possessed the capacity to offer technical challenge and were clear about the additional skills needed to supplement existing capabilities. NOMS' ability to act as an intelligent client was hindered through little technical understanding and a reliance on supplier knowledge, with large volumes of work outsourced. Poor relationships contributed to project milestones not being met".

(National Offender Management Information System, C-13; NAO, 2009b)

In addition to project performance as described above, facilitating suitable knowledge transfer from project teams to operation teams can also strengthen the relationship with a customer (clients of project owner), as well as foster the acquisition of knowledge. Clients' needs are collected during a project, and they are directed to project deliverables during and after a project. Thus, the clients of the project owner in an operational business condition are also critical project stakeholders, and their voices are a source of improving the quality of both project and operation. Below is the example from the NPfIT case. The NHS is the project owner of the NPfIT system and, hence, patients are the customers of the operational business of the NHS. During the process of providing information about the new systems to patients, the NHS collected information about the requirements of patients and modified its systems to allow patients to access their confidential information online:

"As now, patients will have the right to see their own care records and they will also be able to register to view their Summary Care Record online through HealthSpace, another part of the Programme. Given the confidential nature of the information contained in the Summary Care Record, the registration process for HealthSpace involves verification of the patient's identity, including a face-to-face meeting with a registration agent in the local Primary Care Trust".

(NPfIT, C-01; NAO, 2008d)

6.3.2 Project Front-End Capabilities

Engagement of Project Owner

The participation of end users is a necessary condition to analyse the new systems requirements. While managing projects, less clearly identified requirements can escalate the project's ambiguity. Through end users' active engagement, requirements can be defined thoroughly (Doherty *et al.*, 2012). The case below is an example of organisational complexity and the importance of requirement analysis. The aim of this project was to integrate seven different systems. However, further customisation tasks had to be carried out as each organisation had distinctive requirements which were not fully analysed:

“One Oxfordshire hospital had seven different pathology systems before it took the decision to reduce that number before deployment of the Local Service Provider's system. This has meant that Local Service Providers' solutions need to be tailored to each organisation's requirements. These differences in requirements have meant that even after a Local Service Provider has ensured that its solution meets the requirements of one organisation, new work is needed to roll-out that solution to each organisation within its Cluster, making the task of rolling out systems considerably harder than in more homogeneous organisations”.

(NPfIT, C-01; NAO, 2006d)

It is well established that an owner's requirements frequently change during the project life cycle, as well as before implementation (NAO, 2006b; OGC, 2009; Cabinet Office, 2011b; PMI, 2013). The case below identifies the importance of constant end user engagement to manage changeable requirements. In this case, the Defence Information Infrastructure (DII) system was designed and implemented based on the requirements collected at the initiation phase. However, the end users were forced to change many functions and systematic processes after installation due to a lack of communication regarding the change in user requirements. For this reason, the project was delayed and added effort was inevitable:

“12 weeks before DII was due to be installed at a site, the Programme conducted a detailed analysis of the requirements of users. After this point,

users were not permitted to make any significant changes until DII had been installed, so that ATLAS knew how many terminals to install in each room and which software applications each user needed to access. The analysis was not always completed accurately and users at many sites continued to make changes after the 12-week limit”.

(Defence Information Infrastructure Programme, C-07; NAO, 2008b)

Project owners’ participation can contribute to project suppliers by sharing their business knowledge. In general, IS project suppliers are more knowledgeable about the technical issues related to systems, whilst project owners have more knowledge and experience in terms of their own business. Thus, the collaboration amongst those stakeholders can make them more skilful and sufficiently efficient to understand and carry out project tasks.

“Trusts often use staff taken from clinical duties to carry out project management functions because of the value of drawing on their clinical experience. NHS Connecting for Health recognises that the difficulty of finding suitably experienced project management staff to support delivery of the Programme will be exacerbated as deployments increase and greater numbers of staff with benefits realisation or project management skills are needed”.

(NPfIT, C-01; NAO, 2006d)

Furthermore, general practitioners (GPs), as users of the new systems, were also allowed to select specific functions and systems from a new solution to minimise the gaps between the previous process and the new business processes called the GP Systems of Choice:

“In response to GPs’ concerns that the choice of systems offered by the Local Service Providers was too limited... ...There had also been delays in the delivery of the Local Service Providers’ integrated solutions, which would allow GPs to access all the functionality available under the Programme. Under GP Systems of Choice, GPs are able to choose from the systems provided by the suppliers on an approved list in addition to the systems provided by their Local Service Provider”.

(NPfIT, C-01; NAO, 2008d)

Ultimately, the engagement of IS project end users and efficient communication strategies can maximise the overall key value, creating a sense of collaboration, and this can generate positive operational change and benefits (Ward and Daniel, 2012). Most NAO reports emphasise the value of communicational openness to increase awareness of the project benefits and to share an overall project vision. A project that is a mixture of organisational dynamics and harmonisation amongst various organisations is the key success factor to realise project benefits.

Commercial and Contract Management

One remarkable and paradoxical point is that project commercial/contract capabilities are revealed to be relatively less important than other capabilities though it has been recognised that project commercial/contract capabilities are the most significant capability for a project owner side (NAO, 2004a, 2004b, 2006c, 2007, 2008b, 2008c; 2011b). Not only the contract/commercial-related capabilities examined in previous studies but also various project capabilities and relevant managerial issues were identified in this study. These also show a clear difference from the project capabilities of supplier organisations.

Despite their lesser importance, the four major project contractual issues identified in this study are as follows. The first contractual issue concerns roll-out/project close-out capabilities. In comparison with the capabilities during an early contract period, more concerns arise about dealing with a project's close-out (e.g. final payment, risk mitigation, roll-out methodology, acceptance criteria). In procurement of the National Roads Telecommunications Services Programme in the UK, for example, the responsibilities of all organisations (e.g. suppliers, sub-contractors, owners) are emphasised for successful programme completion (NAO, 2008e). The report highlights that integration amongst every organisation is an essential aspect for project success:

“Successful delivery of the Programme is heavily dependent on the suppliers and sub-contractors, who are developing and deploying the various systems. Of crucial importance are the Local Service Providers, who are responsible for the local systems in different parts of the country,

including the care records systems, and for ensuring that these integrate with the national systems that have been developed”.

(National Roads Telecommunications Services, C-05; NAO, 2008e)

Though organisational responsibilities are critically important for project success, there is also a concern that the responsibility is not sufficient for satisfactory performance of IS operation. In the same project case, a project owner, the UK government organisation, argues that it is very hard to measure performance data or judge the outcome of a project right after the project’s close-out because the operational responsibility for upgraded systems transfer takes time (NAO, 2008e). Thus, this case supports the argument of this thesis that project benefits cannot be guaranteed with project success or failure itself:

“The time that has elapsed since completion of the upgrade has been too short to use performance data to judge the likely outcome of the contract. However, under the contract, when GeneSYS took over responsibility for the Agency’s telecommunications services, it had to demonstrate that the reliability and availability of its services were better than the average results recorded over the previous year before migration”.

(National Roads Telecommunications Services, C-05; NAO, 2008e)

The second contractual factor is related to sub-contract management. Due to the characteristics of public sector IS projects, including the limitation of external resource accessibility and in-house development capacities, the increasing proportion of outsourcing/offshoring and the diversity of project stakeholders, vast uncertainties and risks have occurred in project sub-contract management (El-Haddadeh *et al.*, 2013; King and Crewe, 2013; Wilkin *et al.*, 2013; Sandeep and Ravishankar, 2014; Oshri *et al.*, 2015). For this reason, the roles of orchestrating more than 50 pre-existing software packages were collaborated with third-party sub-contractors in the case of the Information Technology Programme in the Department of Work and Pensions in the UK:

“European Aeronautic Defence and Space Company (EADS) has subcontracted the majority of the work to third parties and its main role is to bring these packages together to form the overall IT systems. The

mobilisation system will require the integration and customisation of 50 pre-existing Commercial-Off-The-Shelf (COTS) software packages”.

(Department for Work and Pensions: IT Programmes, C-08; NAO, 2008a)

In addition to the systematic integrity, suitable organisational collaboration capabilities with sub-contractors can improve the quality assurance of system development by avoiding any delays:

“The Department recognises that EADS has and continues to make efforts to strengthen its in-house FiReControl project team. The Department also believes that the relocation of approximately 30 Departmental staff to EADS’s offices, and their close working with EADS and its subcontractors, increases its oversight of EADS and strengthens its quality assurance of the IT system development.

.....

The Department’s contractual arrangements with Accenture aimed to encourage close working with other suppliers where necessary through agreement that neither party would seek remedies from the other for delays in delivery within sensible tolerances”.

(Department for Work and Pensions: IT Programmes, C-08; NAO, 2008a)

Third, supplier management capabilities are recognised as one of the most critical factor for a project owner. In general, a few key factors such as communicating for requirement analysis, managing suppliers’ tasks, recognising financial and delivery risks from suppliers and changing organisational cultures are highlighted for efficient supplier management capabilities (NAO, 2006c, 2006d). In particular, a suitable relationship with project suppliers can maximise the potential possibility to realise operational benefits. In many parts of the NAO reports, the UK project owners mention that a harmonised relationship with project suppliers can lead to efficiency in realising benefits:

“Possible supplier disengagement towards the end of contracts. Suppliers play a crucial role in the realisation of benefits. There is a risk, however, that suppliers who are not awarded a further contract may become increasingly disengaged as the end of their contract approaches. Without the incentive of a future contract, suppliers may potentially focus their attention elsewhere,

leaving trusts with less support and reducing the potential for knowledge transfer between old and new suppliers”.

(NPfIT, C-01; NAO, 2013b)

In addition to above three contract management issues, clarifying pricing policies and strategies for IS and technological deliverables is also regarded as a critical management activity of the project owner organisation. Pricing, the principal factor of project contract management, covers diverse issues such as supplier bidding strategies, item-by-item pricing, solution costing, calculating present value cost and clarifying the reasonableness of technical solutions (NAO, 2008b, 2008e, 2011c).

As above, diverse contract/commercial management difficulties can arise for a public project owner while managing IS projects. Thus, we cannot simply argue that contract/commercial management capabilities are not important. However, one clear thing is that the capabilities are part of a much wider set of owner project capabilities, and other project capabilities are also definitely required, including consideration of project organisations and operational benefits.

The overall results of this thesis create the theoretical and empirical base knowledge to complement the previously suggested owner project capabilities by providing differentiated owner dynamic capabilities as well as contract/commercial capabilities. Contract/commercial management is not a major capability for a project owner, but it needs to be reinforced by other critical capabilities.

6.3.3 Project Governance Capabilities

Project Governance: Responsibilities, Accountabilities and Staffing

The concept of project governance structure incorporates roles and responsibilities, ownerships, staffing, decision-making structure, risk and change management and accountabilities. The key point is a management protocol to secure efficiently optimised decision making by clarifying responsibilities and ownerships from the viewpoint of the owner’s business model, which leads to project benefits realisation (Doherty *et al.*, 2012; Wilkin *et al.*, 2013). In other words, the most crucial element is to provide a clear set of roles, responsibilities, ownerships and authorities of a

project (and even across the business after a project). In the Child Support Reforms project, the governance structure emphasised that the agency (the owner in the project) should concentrate on both roles/responsibilities and obligations, and this supported the owner's central management:

“Uncertainty of agency responsibilities: The contract fails to deal adequately with the agency's responsibilities in respect of delivering the final systems, for example, the contract is specific as to which people from the supplier will work on the contract, but takes in no such obligations on the part of the agency”.

(Child Support Reforms, C-02; NAO, 2006a)

The second function of governance structure is the optimisation of project staffing. Suitable project staffing can lead to improved controllability in dealing with organisational diversity. The example below supports this. In the case of Transport for London, the matrix management approach for staffing was applied. One can interpret that staffing does not just organise the organisation, but also optimises it. Efficiency of organisational facilitation is the right direction for achieving an ideal governance structure:

“For example, at Transport for London's headquarters, staff from both organisations sat side-by-side, and a matrix management approach was used to select a mix of individuals for tasks based on their skills rather than their “home” organisation. Transport for London staffs were also located in the offices of partner organisations such as the Driver and Vehicle Licensing Agency with a remit to proactively build good relations”.

(Congestion Charging, C-25; NAO, 2006b)

Benefits from a clear governance structure include (1) well-defined accountabilities that can be obtained at all stages of a project and (2) a project manager's oversight to manage resources and performance that can be improved on the basis of a transparent business process and optimised staffing policies. Thus, the subsequent identifying, analysing and reporting of relevant information can become more efficient. Moreover, the management can understand the mandatory aspects of projects, which leads to optimised decision making:

“The Senior Responsible Owner has positioned the Programme Board to bring together the three areas of management responsibility critical to a successful strategy: Programme delivery through the Director of Shared Services; business change within the business units; and overseeing the operation of the Shared Service Centre”.

(Shared Services Transformation Programme, C-06; NAO, 2008c)

The above case describes the managerial responsibilities of adopting an appropriate governance structure. As the final outcome, a clear IS project governance structure creates a positive influence on operational performance as well as successful project benefits delivery (Bradley *et al.*, 2012; Doherty *et al.*, 2012; Wilkin *et al.*, 2013).

6.4 Summary

By developing the initially quantified data hierarchy, the key issues of IS projects in the public sector are revealed (RQ1). In order to address the RQ2 and RQ3, the original textual data in the NAO reports were interpreted on the basis of highly coded issues in the final hierarchies. In particular, HR and Organisation in the IS high-level category contained a cluster of the most frequent nodes so this was singled out for further analysis.

The results emphasise the differences in perspective between owners and suppliers on projects, even though they work together collaboratively for the same objectives during the project. First, while a project supplier aims only for project success, a project owner also considers post-implementation management strategies and the realisation of potential benefits. Thus, how the new IS can be operated is an overall issue for the project owner. These owner dynamic capabilities to manage the project are the complement of the supplier’s operational capabilities to manage the project. Therefore, this thesis paid more research attention to the necessity of distinctive project capabilities for a project owner by considering the post-implementation stage. Second, the accomplishment of the project objectives is a practical end point for the project supplier, but a starting point for a project owner as project owners seek to realise the business benefits that the project was initiated to capture in the first place. In other words, responsibility for the achievement of full IS transformation belongs

to the owner side rather than the supplier side. To deal with the change, strategic capability configuration is mandatory for a project owner. Drawing on the data analysis, the results emphasise the importance of project back-end capabilities - training capabilities and knowledge transfer capabilities - as important owner dynamic capabilities.

A few nodes also remind us again about the importance of organisational issues in IS projects that many previous studies already have argued (Doherty and King, 1998; Doherty *et al.*, 2003): stakeholder involvement, governing structure, process and staffing, responsibility and ownership and end user requirements and engagement. From the whole data set, two issues - from an owner's perspective - show a distinctive implication from typical IS project capability issues: knowledge and experience and training and skill. These project back-end capabilities have often been regarded as less significant capabilities in classical project management research studies. Even recently, researchers have still focussed on the value of project front-end capabilities to maximise project performance (Morris, 2013).

CHAPTER 7. DISCUSSION

7.1 Chapter Overview

This chapter includes a detailed discussion of a few topics in response to the key implications from the results and findings. In chapter 6, the results of the content analysis were presented, and the key findings were explicated with the empirical data from the IS project experience in the UK public sector. For further discussion, this chapter is divided into four sections.

The first section includes a discussion of the three research questions and responses. As a reminder, common issues and difficulties in managing IS projects in the UK public sector were identified (RQ1), a project owner's dynamic capabilities for managing IS projects in the public sector were identified (RQ2), and the importance of project back-end capabilities and their utilisation were highlighted as an owner dynamic capability to contribute to realising post-implementation benefits in IS projects in the public sector (RQ3). Answering the research questions yields both academic and practical implications.

The second section discusses the paradoxical value of project commercial/contract capabilities and project back-end capabilities in a micro perspective. As a unique finding, the result from this thesis emphasises the importance of project back-end capabilities from the perspective of the project owner. Contrary to this, the importance of project contract capabilities was regarded as less important than has been recognised to date. Academic achievements in recent decades show that project back-end capabilities have been considered as a less-critical value to a project supplier. Then, project contract capabilities have been regarded as the most critical managerial issue for a project owner. Therefore, this section discusses why there has been a definite difference of opinion between project suppliers and owners.

The third section highlights the theoretical contribution of this study in a macro perspective that a multidisciplinary approach on project and benefits management was applied. This thesis combines two knowledge areas, project management (project delivery) and benefits management (benefits delivery). Understanding the interrelationship between managing projects and benefits is critical for efficient IS facilitation. However, this multidisciplinary combination is a rather unaccustomed approach, and has rarely been attempted in both project management and benefits management disciplines. In this section, the limitations of the conventional

dissociative approach on addressing project and benefits management are discussed. In addition, the importance of a mixed approach between the two is emphasised.

The last section provides a suggested future research agenda for the management of project disciplines by criticising conventional project management disciplines. On the basis of the research results, the concept of owner dynamic capabilities is revisited, and a few owner dynamic capabilities to deal with a project owner's successful project benefits management are suggested. By highlighting the key findings, the future direction of project management studies is provided with the discussion of previous project management knowledge and framework models. In order to support this argument, the new management of projects framework, derived from Morris (2013) is proposed.

7.2 Answering Research Questions

The first research question (RQ1) aimed to determine common managerial issues in managing IS projects in the UK public sector: "What are the common issues and difficulties in managing information systems projects in the UK public sector?" To answer this question, a three-tiered hierarchy covering diverse managerial issues was developed by coding data from selected NAO reports addressing UK IS project cases. The hierarchy is composed of three main nodes: project management (PM), information systems (IS), and public sector (PS) themes.

With respect to general project management topics in the first node, organisational issues appeared most often. In the organisation management node, six common issues were identified: communication, governing structure, process and staffing, leadership, responsibility and ownership, senior level engagement, and stakeholder involvement. The second significant issue was project planning, change, and the effect on managing projects. Various project change issues were revealed, including schedule change, costing change, scope 'creep', and uncertainty from a general perspective. In addition to the organisation and change topics, other general project management issues included the management of project contracts, quality, and risk.

The second node, information systems, revealed common managerial issues related to technology, systems, and IS process aspects. In common with the project

management node, human resource and organisational issues dominated the other themes. The difference between organisational issues in the PM and IS nodes was the organisational consideration of IS factors that the IS node covered. In other words, the importance of IS management and support in an organisation were highlighted and included system end user engagement and support, IS training and skill development, and technological knowledge transfer. The second most significant issue in this node related to technological factors, which included system deployment, software functions, and IS process standardisation.

Last, the key characteristics and management issues of public sector businesses were identified in the third node. The importance of commercial opportunities and collaboration between public and private organisations were highlighted. In addition, external variables, such as international regulations and political impacts on public IS projects, also appeared in the data analysis.

Based on the coded data in the hierarchy, the RQ1 was addressed and the common issues of IS projects in the UK public sector were defined and explored.

The second research question aimed to identify a project owner's dynamic capabilities in managing IS projects in the public sector. In response to the answers for the RQ1, a project owner's dynamic capabilities were identified. Specifically, 'training and skill development capabilities' and 'knowledge and experience transfer capabilities' were the examples as project back-end capabilities; a project owner's engagement capabilities, commercial and contract management capabilities were the examples as project front-end capabilities; lastly, a few governance factors such as responsibilities, accountabilities and staffing were explained as project governance capabilities.

The last research question was answered with the contextual analysis of collected content data from NAO reports in further: "How can owner dynamic capabilities contribute to realising post-implementation benefits of IS projects in the public sector?" Responses to RQ3 were made based on the collected data and the identified owner dynamic capabilities as the capabilities for improving organisational routines. This thesis emphasises the conceptual uniqueness of owner dynamic capabilities that focusses on the business benefits realisation of a project owner compared to a project supplier's static (operational) capabilities. In other words, a project owner's project

capabilities should deal with the business continuity and ‘dynamics’ after an IS project, whilst a project supplier’s project capabilities are considered ‘operational’ and part of the successful delivery of the IS project itself. The concept of owner dynamic capabilities covers the ‘operational benefits with IS project deliverables’ that is critical to a project owner; specifically, by extending the coverage of project capabilities. As the most significant finding of this thesis, the importance and necessity of project back-end capabilities were suggested as being a core part of owner dynamic capabilities. These project back-end capabilities include supportive capabilities such as training, skill development, knowledge transfer, and IS project experience sharing.

The original contribution of this study, project back-end capabilities as owner dynamic capabilities, can be strengthened when comparing past project management and capability studies. As criticised in the literature review (2.3 Organisational Capability in Managing Projects, and 2.2.3 Management of Projects) and considering the current results, traditional project capability studies have relied heavily on the fundamentality of project execution with project front-end management without achieving a contextual understanding of project owners’ business strategies and environments. Thus, theoretical understanding is necessary to address the notion that the aim of IS project is not the successful delivery of IS but the realisation of post-implementation benefits with the IS project deliverables. The exemplars of owner dynamic capabilities (e.g. training, knowledge transfer and skill development) support the argument for why owner dynamic capabilities are important and how they can be facilitated. To support this argument, a knowledge framework highlighting a future agenda for the management of projects is developed as a further theoretical contribution based on Morris’ MoP framework (Figure 7-1).

7.3 Reflection on Classic Project Capability

7.3.1 Project Commercial/Contract Capability

Researchers have expressed continual interest in the necessity of project capability which leads to business benefit realisation (Davies and Brady, 2000; Söderlund, 2005; Stevenson and Starkweather, 2010; Melton *et al.*, 2011; Ward and Daniel, 2012).

However, it is indisputable that earlier project management studies tended to focus only on the capability of the project-based firms that supply resources to the project (Winch, 2014). This supplier-focussed research has also suggested the importance of client-specific capability (Ethiraj *et al.*, 2005; Aritua *et al.*, 2009; Kaiser and Buxmann, 2012), but most have shown only a limited perspective on the owner's roles, such as commercial/contract and supplier management. In terms of a project owner's capability, most studies have focussed on the value of contract management capabilities (NAO, 2004a, 2004b; 2011b).

However, the finding of this thesis is different; from an owner's viewpoint, the importance of contract management is less emphasised than organisation/change management (Organisation Management: 40.06% coded, Planning & Change Management: 20.18% coded, Contract Management: 14.24% coded). Thus, the findings suggest that the concept of owner dynamic capabilities needs to enlarge its managerial coverage to include the recognition of organisational issues as well as contract/commercial management in comparison to those of the project supplier.

In particular, a few project back-end capabilities such as training, knowledge/skill transfer and relevant experience are also remarkable and distinctive owner dynamic capabilities in this thesis. Owner dynamic capabilities need to be understood within a wider organisational viewpoint rather than through project commercial/contractual issues. As mentioned above, the result highlights more complex and diverse project management issues from a project owner's viewpoint. In addition, project owners need to consider operational stages after a project with regard to benefits realisation and management. Closing a project is also the starting point of new management routine for a project owner as new or improved IS and relevant business processes arise. With regard to project capability, a project owner should have suitable capabilities to deal with business and systems change. In this context, a project owner's project capability and a dynamic capability approach have a similar tone in that both focus heavily on organisational change and operational benefits realisation by configuring existing operational capabilities.

7.3.2 Paradoxical Value of Project Back-End Capability: Owner Dynamic Capability

Classic project management studies recognise project back-end capabilities, such as end user training and IS knowledge transfer, but as less significant. A few project management studies have given their research attention to the importance of training capabilities, but the point of view is in a project supplier. For example, Morris (1997) highlights project training issues, but only considers the training for project execution (not a project owner's IS operational training). The results from this thesis, however, show the opposite. With regard to the realisation of a project owner's business benefits, project back-end capabilities are shown to be critical. This paradoxical result needs to be clearly understood to manage projects and relevant training programmes more efficiently.

The first reason for the paradoxical result related to the different recognition of project objectives between a project supplier and owner. Previous project management studies have focussed heavily on 'a project supplier's perspective' (Winch, 2014). As explained in the literature review, project management research has focussed largely on the value of effective project management - what a project supplier does. Similarly, practitioners in project industries also rely more on the project supplier's technical and methodological aspects, representatively based on the PMBoK model (PMI, 2013).

This supplier-focussed project management approach can lead to difficulty in realising project benefits. In the case of NPfIT, it is highlighted that suppliers cannot 'sufficiently' play a crucial role in realising project benefits. The uncertainty of further contract and the discontinuity between old and new suppliers, for instance, could lead to the difficulty of project benefits realisation. Thus, the fundamental ownership of project benefits realisation belongs to the project owner, not the supplier - see details in section, 6.3.2 Project Front-End Capabilities: Commercial and Contract Management (NPfIT, C-01; NAO, 2013b).

Similar to the first reason, project management studies to date have regarded a project as an 'execution based' work pattern (Morris, 2013; Pinto and Winch, 2016). This perspective stems from the fact that project capabilities and benefits studies have been conducted from a fixed project life cycle approach as the absolute start-

end process (Zwikael and Smyrk, 2012; Marnewick, 2016). This approach can lead to a critical error of neglecting the ultimate reason for the project - improving operational benefits. In the case of the National Roads Telecommunications Services project, it is pointed out that project benefits cannot be evaluated during or right after a project (NAO, 2008e). The difficulty of having performance data to judge the outcome of project is inevitable as soon as a project is completed - see details in section 6.3.2, Project Front-End Capabilities - Commercial and Contract Management.

A few recent studies also support this argument. Heeks (1998) analyses the case of IS training project in the public sector and highlighted the value of training capabilities as an IS owner in public organisations. The UK government report also pointed out the positive influence of an IS training programme (Home Office, 2012; NAO, 2015b). The researchers argued that such a programme could advance productivity of public owner organisations by taking a strategic approach on knowledge sharing and training. This approach could also contribute to improving individual competencies, minimising managerial risks, and assuring public service quality.

Cha (2012) identifies the twenty project capabilities and competencies of software project suppliers, and each was evaluated by software project managers (a project supplier) to judge the level of relative importance across the project life cycle. One interesting point is that training and education capabilities were recognised as the least important amongst the whole capabilities set. To a project supplier, a project is the concept that needs to be executed in a certain period. Thus, it can be interpreted that the training factor received the lowest interest from a project supplier viewpoint, despite the importance of it to a project owner's operational benefits realisation.

Morris (2013) and Pinto and Winch (2016) criticise the limitations of the execution-based approach for projects. Those works emphasised the importance of the organisational perspective and project front-end capabilities beyond project execution. Thus, not only the project execution capabilities but also the front-end capabilities are considered as an essential aspect to realise operational performance after the project completion. The authors argue that clarifying project front-end activities could trigger the benefits from IS project execution.

The fundamental aim of a project is to improve operational performance. A project is planned and created because of a need within the owner organisation that is the actual operator of the project deliverables. As the provided results/findings and relevant analysis, a real need exists to interpret a project using a wider perspective by covering a project owner's benefits realisation goals. In this context, the necessity of project back-end capabilities to transfer project knowledge to operational performance is significant for a project owner.

7.4 Reflection on Project and Benefits Management

7.4.1 Disjunction between the Management of Project and Benefits

Since the project management disciplines emerged, it has continuously evolved with a comprehensive understanding of how to achieve project success in practice (Morris *et al.*, 2012). Scholars have theorised project management disciplines from various viewpoints (Morris, 2013), and project management practitioners have established suitable tools and techniques in practice such as APMBoK (APM, 2012) and PMBoK (PMI, 2013). However, there seems to be no doubt that most project management studies to date have contributed within the boundary of a fixed project life cycle, an execution based approach from project initiation to project close out (OGC, 2009; PMI, 2013; Marnewick, 2016). This "settled approach" (Pinto and Winch, 2016), execution-based project management, starts with a common belief with respect to the known features of project execution, 'temporariness' and 'uniqueness'. This means that a project has a clear start and end point with specific goals. The two features, however, could restrain viewing a project from different angles, and the theoretical spectrum of project-related studies cannot be enlarged because of this fixed approach.

This fixed approach is taken for granted especially in relation to a project supplier, as a project closing with the successful delivery of the project aim is a key result (Zwikael, 2016). A project owner, however, may not be satisfied with project success only (Winch and Leiringer, 2016). In other words, the owner's fundamental project motivation is not project success but realising business benefits from project deliverables. Therefore, managing projects and realising benefits are in an indivisible

relation to a project owner, and what happens after a project life cycle is a critical managerial concern (Shenhar and Dvir, 2007; Ashurst *et al.*, 2008; Zwikael and Smyrk, 2012; Marnewick, 2016; Zwikael, 2016).

Nonetheless, the multidisciplinary combination of the two is still one of the least examined approaches in the academic field of project management. In the case of project management studies, limited research attention has been placed on realising benefits after projects because of a supplier-focussed and execution-based approach (Doherty *et al.*, 2012; Zwikael, 2016). Most project management studies have been carried out within the project life cycle boundaries, and only few studies have focussed on a project owner's perspective (Breese *et al.*, 2015; Marnewick, 2016; Winch and Leiringer, 2016). Similarly, extant benefits management studies have limitations related to the case of IS. Specifically, most IS benefits research have tended to focus more on IS investment or IS value (cost-benefit) analysis without recognising IS implementation stages and organisational aspects (Ward *et al.*, 1996; Shang and Seddon, 2002; Seddon *et al.*, 2010).

7.4.2 Multidisciplinary Approach with Dynamic Capability

In order to reinforce the limitations of a separated approach on managing projects and benefits, this thesis adopted the dynamic capabilities conceptual framework. The context of dynamic capability is placed on dealing with business change and improvement (Eisenhardt and Martin, 2000). In other words, dynamic capabilities enhance the level of business change positively by configuring existing operational capabilities or by creating new operational capabilities (Winter, 2003; Davies and Brady, 2016). Moreover, dynamic capabilities can be a more efficient approach particularly for public sector organisations as “they struggle to respond effectively to changes in their environments” (Piening, 2013, p. 210). In this context, this thesis has a nuanced position on a project owner's dynamic capabilities (focussing on project benefits realisation) and a project supplier's operational capabilities (focussing on project execution) in the context of project management environment.

Within the perspective of a project owner's organisation, the project owner needs to have appropriate dynamic capabilities (owner dynamic capability) to deal with

business change that lead to efficient operational management after a project. In other words, a wider recognition of the scope of project management is required, and managing and minimising the capabilities gap is key for a project owner. Conversely, a project supplier considers the successful delivery of a contracted project without the full recognition of future benefits of their project-client organisation.

Based on the theoretical grounds of dynamic capabilities, the two knowledge areas (managing projects and benefits) are combined to examine the concept of owner dynamic capabilities. Then, by emphasising the necessity of owner dynamic capabilities, the importance of a project owner's business continuity from project to operation was considered.

Thus, the concept of dynamic capabilities supports the multidisciplinary approach on minimising the disjunction between managing projects and realising benefits. Based on this theoretical approach and the key findings of this thesis, the next section will provide a future agenda for project management and implications by reviewing classic project management body of knowledge models and by developing a project management knowledge framework derived from Morris (2013) and Pinto and Winch (2016).

7.5 Enhancing Project Management Disciplines

7.5.1 Criticism of Classic Project Management Knowledge Models

The PMI's (2013) PMBoK model has widely been considered as a *de facto* standard set of project management knowledge. As discussed in the literature review, the PMBoK has been revised four times, and its technical knowledge, such as inputs, tools and techniques, and outputs, has been advanced continuously. In this regard, two major limitations can be criticised. First, the PMI model focusses heavily on the viewpoint of the project supplier. By providing a five-staged project management life cycle (initiation, planning, executing, monitoring and controlling, and closing), the PMBoK defines the critical processes and activities of a project supplier. This execution-based model provides valuable resources for managing projects; however, the roles and responsibilities of the project owner are not fully covered.

Because of the limited approach, the PMBoK cannot consider operational benefits and values after executing a project. In general, business benefits (via project deliverables) cannot be achieved with the successful delivery of a project. The fixed project life cycle and relevant project capabilities provided by the PMBoK focus only on project procurement itself and it does not recognise a project owner's operational benefits realisation. PMI explains the values of project benefits at the level of programme management. In other words, current project management disciplines need to consider the fundamentally different project objectives between a project supplier and owner. There is a clear distinction between a project supplier's capabilities and an owner's capabilities (Winch, 2014).

This sort of limitation can also be explained in the APM's APMBoK model. In order to overcome the execution-based approach, APM (2012) shows a different viewpoint when dealing with project management. For example, not only project execution activities but also the criticality of project governance, project organisation, and a business strategy are emphasised. This context can also be found in Morris' (2013) framework. In a recent valedictory publication, *Reconstructing Project Management*, Morris (2013) criticises the conventional project management knowledge base with extensive theoretical underpinnings to re-draw the post-knowledge model of project management. The Management of Projects (MoP) framework is provided to reconstruct the current practice of project management that relies on an execution-oriented approach (Morris, 2013; Pinto and Winch, 2016). In addition to project delivery, the author suggests the necessity of project definition (e.g. strategy & finance, commercial and organisational activities). Morris' MoP framework and relevant information can be found in the section 2.2.3 Management of Projects.

The next sections briefly review the research findings, and offer an enhanced knowledge framework for the future of the management of projects based on empirical evidence from the findings of this thesis.

7.5.2 Research Findings and Project Management Body of Knowledge

In the literature review (chapter 2) and the previous section (7.5.1), a few PMBoK models, such as PMI's PMBoK and APM's APMBoK, were reviewed. On the basis

of key findings in this thesis, the conventional project management knowledge models were criticised.

As a reminder, the results emphasise the necessity of the wider management coverage of a project owner's project capabilities. To put it concretely, the findings can be summarised into three aspects: project back-end capabilities, project front-end capabilities, and project governance capabilities.

First, the findings have original implications that owner dynamic capabilities are suggested for project owners' capabilities for facilitation and application in practice: IS training, new skill development, and knowledge transfer. Theoretically, a project has a certain start and end point; however, managerial issues still exist for owner organisations even after a project completion—when the project team is disassembled (Melton *et al.*, 2011; Ward and Daniel, 2012; Badewi, 2016). In this context, an on-going management framework is essential to facilitate project deliverables efficiently, and the grounds for managing them lay in the project back-end capabilities based on knowledge transfer (Williams, 2011; Wagner *et al.*, 2012). If deliverables are in the form of systems or software, technical knowledge and relevant IT literacy are required via suitable training programmes; a critical aspect in IS project cases (Heeks and Bhatnagar, 1999; NAO, 2006a; Home Office, 2012).

Second, the results reconfirm the importance of traditional project front-end capabilities (e.g. organisational engagement and project governance) that have been emphasised continuously in recent studies (Wilkin *et al.*, 2013; Davies and Brady, 2016). The significance of project owner engagement is considered as a matter of course to realise project benefits (OGC, 2009; Grabher and Ibert, 2011; Melton *et al.*, 2011; PMI, 2013). In particular, because of the environmental characteristics of IS projects, the engagement of system end users is a critical success point (Doherty *et al.*, 2003; Doherty *et al.*, 2012; Ward and Daniel, 2012). Though avoiding end user participation can also make an alternative route to cost cutting and IS project success in some conditions (Lyytinen and Newman, 2015). However, it is still widely recognised that end user participation has a positive effect on IS management. In the analysed case of the National Programme for IT (NPfIT—the largest IS project of the NHS in United Kingdom), diverse end users were involved, including IT managers,

general practitioners, doctors, nurses, and allied health professionals to implement satisfactory systems.

Third, in addition to the two types of capabilities, the importance of a consistent approach to project governance was highlighted. With a full understanding of the importance of project governance principles, the loss of skilled staff, IS expertise and management capabilities can be minimised.

7.5.3 Advanced Knowledge Framework for the Future of the Management of Projects

In order to enhance the context of conventional project management disciplines, Figure 7-1 is developed by applying the key findings (project back-end, front-end and governance capabilities) from this thesis, including a project owner's differentiated perspective and the benefits management aspect. Structurally, the framework was derived from Morris' (2013) Management of Projects framework. The Morris' framework highlights the importance of project front-end issues to overcome the limitation of execution-based approach. However, the framework does not distinguish the roles of a project supplier and an owner organisation which is the key aspect for benefits realisation. The explanation of the revised and newly added components on the original framework is as follows.

Horizontally, the knowledge areas are divided by the project owner's and project supplier's perspectives to categorise the capabilities and knowledge areas of the two major project organisational bodies. Vertically, the Operations and Value Creation stage was added as the last phase in the project life cycle to highlight benefits realisation activities. Moreover, the Close-out stage is replaced by Transfer to point out the significance of a continuous approach from project execution to project benefits delivery. Third, the knowledge domains of Project Governance and Project Benefits are added based on the findings of this thesis. In addition to the traditional project management boundaries covered by Project Delivery, the importance of front-end, back-end, and governance capabilities are included as the key managerial factors of project owner organisations. As seen in Figure 7-1, a project owner's

capabilities are different from those of a project supplier. The concepts and components of the framework are summarised as follows:

- **Life Cycle Model:** The life cycle model is composed of six stages: Concept, Feasibility, Definition, Execution, Transfer, and Operations and Value Creation. The former four stages originated from Morris' MoP framework. The fifth stage, Transfer, points to the importance of connectivity between project execution stages and operational stages. In Morris's framework, this stage is defined as Close-out and is the last stage of the life cycle. By changing it to Transfer, it can be connected with the next stage, Operations and Value Creation. The last step conceptualises the process of project benefit realisation and management during a project owner's operations.
- **Project Definition (Front-end capabilities):** The collaboration between a supplier and owner is critical. In advance of project kick-off, this phase clarifies the objectives of projects and the roles and responsibilities of each project stakeholder. This component has the same elements as Morris's approach. Two minor amendments are as follows. First, a project owner's managerial position is enlarged compared to that of the project supplier. To emphasise the project owner's responsibilities of project definition activities, the level of proportion between a project owner and supplier is modified. The major role of this domain belongs to a project owner. Second, the continuity of commercial and organisational capabilities between Project Definition and Project Governance is highlighted (see dotted arrows in the figure).
- **Project Delivery (Supplier):** Most project management studies have focussed heavily on the activities in this component and, to date, the domain knowledge is well established. In other words, traditional project management knowledge and activities (e.g. PMI's PMBoK) are set in the narrow project life cycle from Definition to Transfer stages. The roles and responsibilities of this component belong to a project supplier to achieve the successful delivery of the project.
- **Project Governance (Owner):** Project governance relates to a project owner's managerial roles during a project life cycle. A few studies have highlighted the importance of project governance in terms of user engagement and contract management. The findings from this thesis support this and point to

the importance of project governance. The elements include supplier management, contract management, stakeholder involvement, user engagement and support, and project governance.

- Project Benefits (Back-end capabilities): This component is added based on the key finding of this thesis. Few studies have focussed on the role of the project owner to create value/benefits from IS. The findings of this thesis suggest that benefits creation and realisation need to be approached in the implementation stages (from project level to operation level). As emphasised in the results and findings sections, a few owner dynamic capabilities, such as training, and knowledge transfer, are included. The elements of this component are employee training, knowledge transfer, operation governance, process change, and systems transition.
- Interfaces: In addition to the major four components and six-stage life cycle, a few internal and external interfaces are also emphasised: interaction between owner and supplier, interaction with general environment, and identifying a business need to improve legacy systems.

Based on the key findings from this thesis, this framework is suggested as the future research direction of the management of projects by covering both organisational perspectives and project front-end, project governance, back-end capabilities. Based on the current research findings as empirical evidence, the theoretical framework suggests a future direction of for project management research.

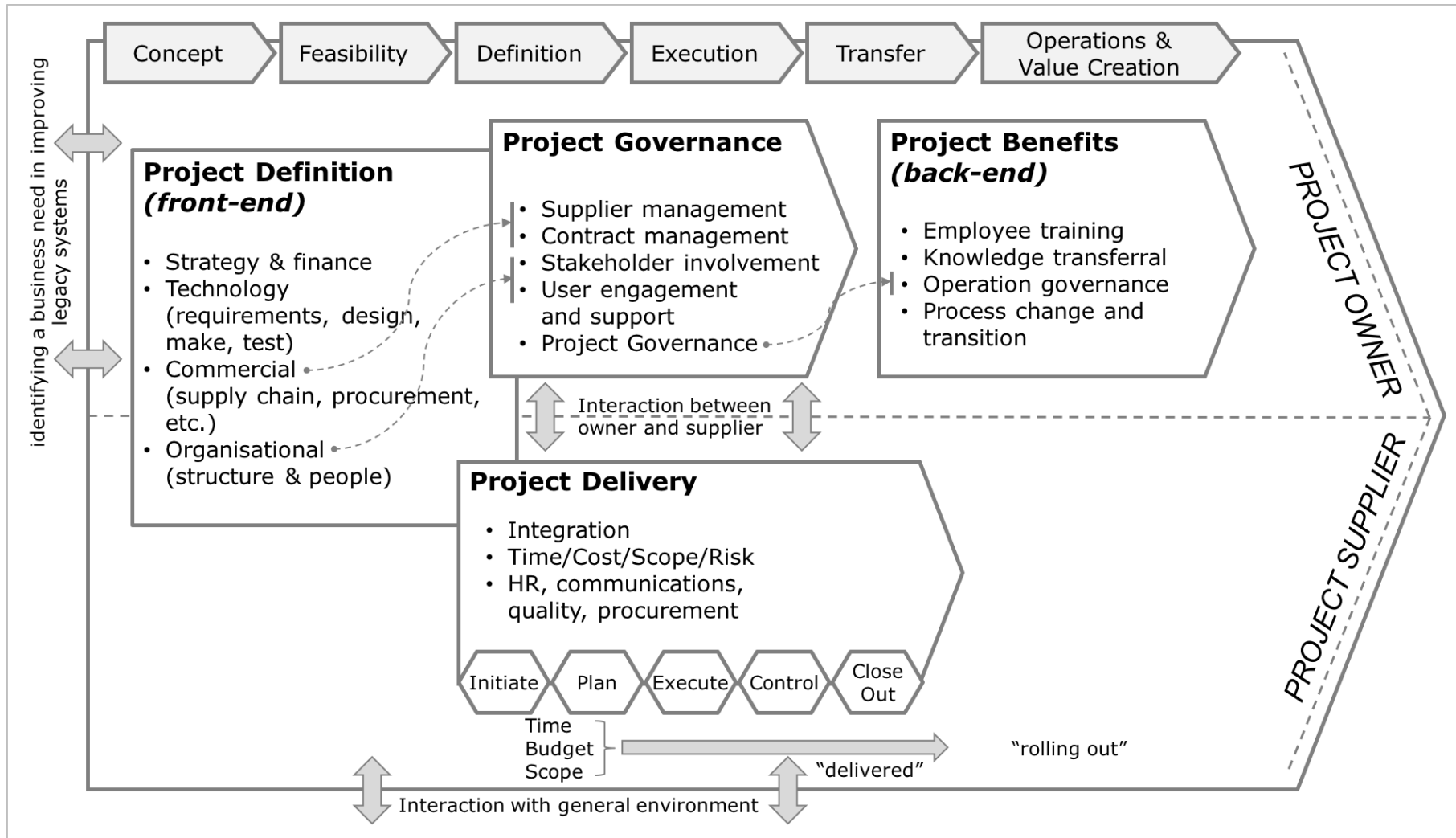


Figure 7-1: Future agenda for the management of projects (derived and developed from Morris, 2013)

7.6 Summary

In this chapter, four topics were discussed in further detail based on key implications from the content analysis. First of all, the three research questions were revisited to give clear answers. By summarising the key results and findings, the research questions were answered and supported with empirical evidence.

Second, at a micro level, the value of project front-end capabilities (e.g. commercial and contract management) and project back-end capabilities (e.g. training/knowledge sharing capabilities) was discussed. The findings support the conclusion that project front-end capabilities cannot stand alone as the main project capabilities for a project owner, and back-end capabilities need to be reinforced. The relatively different importance levels of commercial capabilities and training capabilities between a project supplier and owner were discussed. Then, its criticality was argued by accentuating the leverage of operational performance of a project owner.

Third, at a macro level, a mixed approach of the project and benefit management disciplines were built based on the context of dynamic capabilities. Classic project management research has tended to explore projects without sufficiently recognising operational performance after a project. Previous research on IS benefits management has shown a biased tendency as a majority have dealt only with quantitative values (e.g. return on investment and cost benefit analysis) with limited consideration of system implementation processes (Brynjolfsson, 1993; Ward *et al.*, 1996). By taking a mixed approach of the two disciplines, this study gives research attention to the importance of wider project management boundaries, including the benefits realisation stages.

On the basis of above findings and discussions, fourth, the results of this thesis emphasise the importance of project back-end capabilities as owner dynamic capabilities from a practical viewpoint. In this regard, the derived model, the management of project framework, was developed by reviewing Morris' (2013) and Pinto and Winch's (2016) prior models. Throughout this framework, this thesis proposes the need to reinforce the knowledge areas of project management.

CHAPTER 8. CONCLUDING REMARKS

8.1 Chapter Overview

In this final chapter of the thesis, the overall conclusion will be provided. This chapter contains four sections: key implications, limitations, contributions and further research areas.

In the first section, concluding remarks will be offered regarding the research context, research questions, methodological approach, key findings and implications. Second, the limitations of this study will be pointed out in terms of the collected data and the applied method. Third, the contributory aspects of this study will be highlighted based on the key findings and implications. Last, additional topics will be outlined as suggestions for further research.

8.2 Conclusion and Key Implications

In brief, the aim of the study was to contribute to a deeper understanding of why public sector IS projects are so challenging; to do this, the study explored 31 IS project cases in the UK public sector and adopted content analysis (mix of quantitative and qualitative analysis) by examining the NAO reports. As a reminder, the specific research questions were: What are the common issues and difficulties in managing IS projects in the UK public sector (RQ1)? Which dynamic capabilities are required by a project owner for IS projects in the public sector (RQ2)? How can owner dynamic capabilities contribute to realising post-implementation benefits of IS projects in the public sector (RQ3)? After clarifying the concept of owner dynamic capability in response to the literature review and the data from collected NAO reports, key issues of project management, information systems and the public sector in the UK were identified through the content analysis of NAO reports; Tables 6-4 through 6-21 address RQ1. On the basis of the reviewed literature and results of RQ1, a project owner's dynamic capabilities were identified; this addresses RQ2. By interpreting the data specifically, critical owner dynamic capabilities and the ways of their utilisation for improving organisational routines that aim for benefits realisation were revealed; this addresses RQ3.

In the research initiation stage, the objectives of and necessities for the study were clarified by identifying the current problematic phenomenon of IS project

management and performance in practice. The low performance of IS projects triggers the difficulties in realising their post-implementation benefits. Numerous project capability studies have addressed the issue, but most have focussed heavily on the capabilities of a project supplier rather than how IS project deliverables can be delivered more efficiently. In contrast, little research has been conducted on the importance of the roles of a project owner in realising post-implementation benefits from the IS. For this reason, the significance of a project owner's capabilities to deal with realising operational benefits with the newly implemented IS has not been fully recognised. In this context, this thesis suggests that owner dynamic capabilities help minimise the gap between a project owner's legacy capabilities and newly required capabilities with regard to the IS project management and its deliverables.

As the second stage of thesis development, the literature review was carried out in advance of data collection. Initially, three main topics (capability and benefits, project management and information systems) were identified, and the review framework was developed with three themes derived from the combination of initial topics: capabilities in managing projects, IS and benefits realisation and public IS projects in the UK. This was followed by the key review results and critiques, as follows. First, critical concepts were defined and clarified, including capability/competency, project/programme and benefits realisation management. Second, the characteristics and concerns of managing public IS projects were identified and critiqued by reviewing key literature and UK government reports. Third, the concept of owner dynamic capabilities was defined as the dynamic capability required by project owners in order to efficiently initiate, execute and close out an investment project and to bring the reconfigured operational capabilities into beneficial use. Last, research questions were revised to more clearly define the aim of the research.

In the third stage, the methodological approach was clarified. This thesis adopted content analysis by collecting 10 years of NAO VfM reports published by the UK central government, covering 31 IS projects in the UK public sector. The textual data in the selected NAO reports were initially quantified using frequency counts (a paragraph as a unit of analysis), and the results were interpreted qualitatively by analysing the original report data. The 15 reports covering 31 UK IS projects were the main sources for the analysis. Ten years of NAO report data published in the

category of ICT and Systems Analysis were collected. With respect to the data analysis process, identifying key issues of each paragraph, creating data nodes and coding contents were abductively and iteratively carried out to develop the inductive data hierarchy in Nvivo 9 software.

As a result, a three-tier hierarchy was developed based on three major topics: project management, IS and the public sector. The responses to RQ1 aim to understand the managerial issues and concerns of IS projects in the UK public sector. In response to RQ2, the necessity of the concept of owner dynamic capability (defined in the literature review) was echoed. On the basis of the collected data and developed data hierarchy, the results highlight the importance of owner dynamic capability and provides examples of it: this addressed RQ3.

The key findings can be summarised as follows. First, the findings draw our attention to the significance of owner dynamic capabilities for realising benefits from IS investment with a long-term approach from the IS project implementation stage to the post-implementation stage. This wider business perspective implies that project owners need to enlarge their capabilities beyond contractual matters and progress control with a wider approach to the role of project owner as a strategic actor. Owner dynamic capabilities need to be considered alongside a continuity approach ensuring business as usual while also capturing post-implementation benefits after project hand-over. Second, this thesis puts a strong emphasis on the necessity of project back-end capabilities as one element of owner dynamic capabilities. In addition to the conventional project front-end capabilities such as investment appraisal, requirements capture and stakeholder management, a project owner needs to facilitate suitable project back-end capabilities to realise post-implementation benefits from IS investments aimed at securing new and reconfigured operational capabilities to meet stakeholder requirements. Training and on-going knowledge transfer are suggested as exemplars of owner dynamic capabilities. Moreover, the results echoed the importance of understanding the organisational context in an IS project. This reminds us once again that managing IS projects is not about technology but rather the human element is crucial for successful outcomes. Third, based on the context of owner dynamic capabilities and the key findings, the enhanced project management knowledge model was provided. Last, further discussions were provided on the basis of key implications from the research

findings (e.g. value of project training capabilities and a multidisciplinary approach to the management of project and benefits).

8.3 Limitations

The findings in this thesis are subject to at least four limitations: two limitations of data and two of method.

First, further validation of NAO reports would provide more reliability in the results with respect to the collected data. As explained in the methodology chapter, published NAO reports are reviewed and confirmed by the Public Accounts Committee in the UK Parliament. However, one could criticise that the reports are still written and reviewed by the UK government with no objective verification by external organisations. Though the report is written on the basis of factual information regarding UK IS projects, potential biased views and approaches could creep in.

Second, the collected data only cover the IS project issues in the case of the UK central government. In other words, the generalisability of the thesis results is subject to certain limitations. Other organisations in other countries may have different perspectives and concerns in terms of managing IS projects and realising IS benefits. The thesis results cannot cover all public organisations across the world because they have different features.

Third, the coding approach of content analysis is not the only approach, and different approaches could develop different results (e.g. inductive and deductive coding). This research adopted an inductive coding method, and therefore all of the sub-nodes in the hierarchy were derived from the actual NAO report data (to cover what the NAO reports really say). For this reason, the result hierarchy shows a model that is less clear in its logic; thus, one may ask whether all the sub-nodes were structured in a clear and logical way. For instance, this thesis identifies the issues about human resources and organisations as the most frequent value in the Information Systems node. Readers may question why the organisation and HR issues are grouped together.

Last, another methodological limitation in this research is the lack of current case information on the UK public sector. The data from the NAO reports cover past project issues in the UK public sector. Thus, the case study method (e.g. interviews and surveys) covering current project information could complement the data quality of the thesis.

8.4 Contributions and Applications

This section assesses the possible applications and contributions of this thesis. The thesis results highlight theoretical contributions and practical applications, as follows.

The findings from this study make three major contributions to the current literature towards enhancing our understanding of project capabilities and benefits: clarifying the concept of owner dynamic capability, providing examples of project back-end capabilities and signposting the future direction of the management of project framework.

First, the concept of owner dynamic capability and its necessity are clarified and emphasised, and this can help contribute to researchers in project/benefits management disciplines. The principal theoretical contribution of this thesis is to demonstrate the importance of owner dynamic capability to accelerate post-implementation benefits after a project is completed. IS project deliverables, such as effective and efficient organisational information infrastructures, benefit the project owner who makes the investment and its end users and customers who use the services the infrastructures provide to meet their needs. Post-implementation benefits therefore rely on the maturity level of the owner dynamic capabilities. Thus, this thesis argues that a real need exists to focus on owner dynamic capabilities versus conventional approaches that emphasise project supplier capabilities. However, limited research attention in the literature has been given to the project owner's management capability and perspective. The 10-year data of UK government reports were analysed using content analysis with a qualitative approach. Though relevant studies have been based on specific topics in managing projects, this thesis takes a comprehensive approach to identify owner dynamic capabilities in a project context.

In addition to the conceptual clarification of owner dynamic capabilities, this thesis provides project back-end capabilities as examples of owner dynamic capabilities that can contribute to project practitioners and IS managers in owner organisations. As a critical value of a project owner, project back-end capabilities are a means of achieving post-implementation benefits such as training and skill development capabilities. Project back-end capabilities and relevant issues have been regarded as less critical than front-end capabilities. This research claims that this is due to the lopsided research tendency towards a project supplier's execution-focussed approach to managing IS projects. The study finds that training and knowledge transfer capabilities accelerate a project owner's realisation of benefits after IS project close-out.

On the basis of the key findings, this thesis develops the management of project (MoP) framework derived from Morris' (2013) approach that contains the future direction of project management disciplines. As mentioned in the discussion chapter, the key findings from this study and Morris' MoP framework are combined together, and the revised framework suggests the approach to use to fully understand the context of the project management from both the project supplier and owner sides.

In terms of the application of this study in practice, the results can be used to improve the adoption of owner dynamic capabilities together with relevant post-implementation benefits for project owner organisations in the public sector. In an IS project management environment, both a project supplier and an owner organisation have tended to focus on executing the IS project to make a successful delivery of IS. However, IS project owners may have a differentiated approach to planning and dealing with their project capabilities after understanding the context of this thesis; they may now focus on the importance of project back-end issues and their operational benefits.

Furthermore, the content analysis result (Tables 6-4 through 6-21 in the results chapter) can also help in understanding the recent issues and difficulties in managing IS projects in the UK public sector for both academic researchers and IS project practitioners. The quantified results of this thesis (interim findings) highlight the relative importance of each project management issue within a project owner's viewpoint. The results can provide historical data and insight for future management

considerations to a project owner organisation in terms of managing IS projects, programmes and benefits.

8.5 Further Research

Four areas for future research are identified. First, further examining the concept of owner and other project stakeholders could improve the quality of the findings in this thesis. For example, the concept of owner in this thesis does not distinguish between an IS owner and an IS operator. Due to characteristics of the owner organisation, the owner and the operator of IS may differ in a certain organisational situation. Further research on the intrinsic attributes of owner organisations may advance the context and feasibility of owner dynamic capabilities. Furthermore, relatively different recognition of the importance of each capability may exist amongst diverse project stakeholders. Examining the relative importance of owner dynamic capabilities from various points of view (project stakeholders) will enhance the theoretical depth of this study.

Second, in response to the limitations of this thesis, a case study method and interviewing current project practitioners in owner organisations would be beneficial. The textual analysis approach applied in this research aims to find empirical evidence from historical data in the UK public sector. In addition to this analysis, further studies with current project information (e.g. interviews) would enhance the context of this study with a timely value.

Third, examining the work patterns of project training and skill development in practice may be another research topic related to this thesis. The findings from this study highlight the necessity of training and knowledge transfer capabilities as ones of project back-end capabilities. However, the detailed information of those capabilities was not covered specifically: e.g. current schemes of IS training in the UK public sector, a project owner's recognised importance level and difficulties of IS project knowledge management. Thus, the question of how training capabilities can be enhanced and how this can be beneficial in realising operational benefits can be answered by carrying out further study.

Fourth, a comparative study would also be a good option to further the understanding of this research. For instance, a project owner's capabilities can be differentiated between the private and public sectors. Moreover, other industry sectors (e.g. the engineering industry) may have different perspectives on realising operational benefits; information systems and technologies are intangible with respect to the value of immaterial assets.

8.6 Summary

This chapter summarised the overall research process and outputs and offered conclusions based on the findings. In the first section, the overall context of the research, including background, objectives and research questions, was explained. After that, the implications of the key findings were highlighted. In the second section, the limitations of the study were outlined. In the third section, the major contributions were emphasised.

Theoretically, the concept of owner dynamic capabilities was introduced by combining the project and benefits management disciplines. There is a real need to focus on a project owner's differentiated dynamic capabilities versus conventional approaches on a project supplier side, as well as to use a consistent approach to ensure operational benefits after IS projects. Empirically, the 10-year data from UK government reports about IS projects were analysed using content analysis within both quantitative and qualitative approaches. There is also a need for research attention on the significance of project back-end capabilities as owner dynamic capabilities for public IS, including training and knowledge transfer capabilities. In addition, this thesis has echoed the importance of organisational approaches in technological projects, including end user involvement. Last, potential future research areas were also suggested.

As a reminder, the most significant finding as an original contribution of this thesis is that the importance of project back-end capabilities (as owner dynamic capabilities) was identified. As an example of project back-end capabilities, training and knowledge transfer capabilities were identified within the context of owner dynamic capabilities. Most project management studies have focussed more on the value of

project front-end capabilities (how projects can be executed), excluding the benefits management (how post-implementation benefits can be realised) from the IS project deliverables. However, on the basis of content analysis with complementary qualitative analysis, not only the importance of project front-end but also project back-end capabilities was emphasised. Finally, this thesis suggests the future research direction for project and benefits management disciplines by enhancing Morris' MoP framework.

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APPENDIX. SAMPLE NODE CONTENT

Node IS-4-5: Training & Skill

<Internals\1. Case\ICT 02 Department of Health The National Programme for IT in the NHS> - § 1 reference coded [0.25% Coverage]

Reference 1 - 0.28% Coverage

The Ipsos MORI survey showed that respondents considered that the biggest barrier to implementing the Programme was lack of staff knowledge and staff training. The majority of the NHS's 1.3 million staff will need training to use the Programme's systems, and NHS IT professionals will be needed to implement the systems locally in conjunction with the Local Service Providers.

Reference 2 - 0.22% Coverage

NHS Connecting for Health's strategy requires suppliers to develop IT training to "train the trainers" and then to harness the training and development resources and skills of the local NHS to deliver training in the workplace. Local Service Providers are incentivised to provide effective training of trainers and support for staff to work and use the new systems by being paid, in some part, on usage of the systems they are delivering (paragraph 4.5).

<Internals\1. Case\ICT 03 Child Support Agency – implementation of the child support reforms> - § 2 references coded [0.16% Coverage]

Reference 1 - 0.29% Coverage

In preparation for the new system going live the Agency initially trained 400 staff and a further 7,000 during the first year of operating CS2. Jobcentre Plus needed to train a much higher number of staff, 58,000, as a large number of applications are initiated when parents with care apply for income related benefits, although this was necessarily less comprehensive than the training for Child Support Agency staff. Up to October 2005, training staff to use the CS2 system had cost the Agency over £30 million. However, only caseworkers were given training in the new system, staff overseeing teams of caseworkers were not routinely offered training on how to use the new system.

Reference 2 - 0.03% Coverage

Staff familiarisation and training for each new software release;

<Internals\1. Case\ICT 04 The delays in administering the 2005 Single Payment Scheme in England> - § 1 reference coded [0.31% Coverage]

Reference 1 - 0.62% Coverage

It became apparent during 2005-06 that, in addition to the problems with the computer system, the Agency did not have sufficient staff to process everything on each claim. Large numbers of agency and temporary staff were brought in to process claims. The Agency does not maintain central records of the number or skills of agency and temporary staff used, but their cost data indicate that £14.3 million out of the £21 million spent on agency staff was for work on the single payment scheme. One staffing agency confirmed, for example, that it had provided the Agency's Northallerton office with 247 staff between October 2005 and August 2006. Although the Agency confirmed that it had an induction programme to train new staff, our interviews with staff indicate that the training team struggled to deal with the volume of work. Temporary staff were buddied up with colleagues to learn how to operate the Agency's bespoke computer applications and deal with claims.

<Internals\1. Case\ICT 05 2 Delivering successful IT-enabled business change Case Studies> - § 1 reference coded [0.05% Coverage]

Reference 1 - 0.10% Coverage

The requirement specification within the framework agreement made provision for customers to receive set-up and training services from the Service Provider as part of the licence fee, plus the ability to order additional professional services.

<Internals\1. Case\ICT 09 1 The National Programme for IT in the NHS Progress since 2006> - § 11 references coded [1.36% Coverage]

Reference 1 - 0.30% Coverage

Our visits to NHS Trusts confirmed that the Picture Archiving and Communications Systems had yielded the most tangible benefits to date, for example in helping to reduce diagnostic waiting times. The benefits from other parts of the Programme,

such as the care records systems and Electronic Prescription Service, were yet to be realised, though Trusts clearly saw the potential for benefits in due course. Trusts also highlighted that the Programme had brought wider benefits, for example in enhancing the IT skills of their staff, some of whom previously had low levels of IT literacy and little experience of using computers.

Reference 2 - 0.34% Coverage

Some Trusts we visited had identified savings arising from the deployment of the new systems, but there was also evidence of operational performance declining immediately following a deployment. Some staff had not found the new care records systems intuitive to use and key processes such as booking a new patient into an outpatient clinic were taking much longer than they had previously. This had prompted some Trusts to take on additional staff to input or process data. However, Trusts considered that any negative impact would diminish as staff became more familiar with the systems and more records were entered, removing the need for staff to re-enter demographic and other basic details.

Reference 3 - 0.13% Coverage

Levels of familiarity with the Programme had generally increased, after falling between the first and second surveys, although less than half of doctors, allied health professionals and nurses responded that they knew 'at least a fair amount' about the Programme.

Reference 4 - 0.36% Coverage

We visited 15 NHS Trusts which had implemented new care records systems under the Programme. Overall our visits demonstrated the commitment of local NHS staff, with many working substantial additional hours during key phases of the deployment process. Earlier deployments have tended to be the most problematic, but we saw clear evidence of Trusts spreading the lessons they had learned, largely through informal networks, which most people felt worked best, although occasionally and increasingly Trusts are sharing resources and expertise. For example, in London the Local Service Provider, Strategic Health Authority and Trusts are working together to provide some continuity in deployment teams between one deployment and the next.

Reference 5 - 0.22% Coverage

Training was an important component of every deployment we examined and is

essential for a Trust to operate as efficiently as possible in the period immediately following the deployment. As noted previously, delays to the deployment timetable can impede a smooth transition as the 'go live' date may be some time after staff have been trained in the new system. Some Trusts we visited needed to provide repeat or refresher training as a result of delays.

Reference 6 - 0.23% Coverage

Another common theme was the need for a training environment that was as close as possible to the 'live' system. Most of the Trusts visited expressed dissatisfaction with the generic training environment provided to them, which did not resemble their specific configuration, for example the structures of their outpatient clinics, which may vary from one Trust to another. Some staff were confused when the system went live as it looked different from the one they had trained on.

Reference 7 - 0.28% Coverage

Training appeared to be more successful where it was tailored to reflect people's specific roles, rather than generic to all staff. One Trust designed and delivered training in modules that recognised the Trust was responsible for several hospitals that operated in different ways and reflected the role differences between the hospital sites. It is also important to recognise that the new care records systems can result in more staff actively using the system than previously, and some Trusts also provided basic IT training to help staff who were inexperienced in using IT.

Reference 8 - 0.23% Coverage

The Trusts we visited confirmed that Smartcards were being used as intended. Some Trusts highlighted, however, that system performance had important implications for the effectiveness of the Smartcard arrangements. If it took staff a long time to log into the system using their Smartcard, they might be increasingly minded to leave their card in the 'reader' when they went for a break or to share cards rather than logging in with their own card, in contravention of the rules.

Reference 9 - 0.13% Coverage

Once a new care records system has been deployed a great deal of ongoing effort is required to realise the benefits, and successful realisation depends on the technical performance of the system, the level of staff acceptance and the ongoing support provided.

Reference 10 - 0.22% Coverage

To supplement staff training, Trusts had used 'floorwalkers' immediately after the deployment to help staff use the new system. While in the early deployments Trusts had found that the floorwalkers had themselves not been sufficiently familiar with the system being deployed, in most of the later deployments the floorwalkers were viewed as an essential and effective resource, and some staff felt it would have been beneficial to use them for a longer period.

Reference 11 - 0.27% Coverage

Usage is increasing and since December 2007, 50 per cent of new outpatient appointments have been booked through Choose and Book. Utilisation rates vary considerably, however, with some Primary Care Trusts above 90 per cent and others below 20 per cent. One Trust we visited, which has one of the highest rates, attributed it to the fact that staff had gone out to meet GPs and provided one-to-one training and demonstrations to highlight the benefits of the system. Primary Care Trust staff were also providing ongoing support and advice to local GPs.

<Internals\1. Case\MCT 10 Shared services in the Department for Transport and its agencies> - § 5 references coded [0.81% Coverage]

Reference 1 - 0.51% Coverage

There were insufficient staff with the right skills working on the Programme. Other parts of the Department had agreed at the outset to release staff to work on the Programme, but in practice the number of people with the right business and technical skills who could be released to work in Swansea was constrained, and there was also a lack of trust in the ability of the Driver and Vehicle Licensing Agency to deliver the Programme. The Driver and Vehicle Licensing Agency responded to the lack of resources by drawing on its own staff and outside suppliers. Those staff that were available were allocated inflexibly across the five implementation teams, rather than as a single resource focusing on areas of greatest demand.¹³ A single resource pool was established in October 2006, allowing staff to be used more effectively.

Reference 2 - 0.05% Coverage

insufficient skills in information technology, project management and procurement;

Reference 3 - 0.05% Coverage

concerned over the quality of training provided for the new system;

Reference 4 - 0.21% Coverage

The Department commissioned consultants from Atkins to conduct a customer satisfaction survey and focus groups of staff shortly before we undertook our work. Our findings corroborated the results that they had obtained. Since then, the Driver and Vehicle Licensing Agency has re-launched its user education/training programme.

Reference 5 - 0.81% Coverage

At the time of our examination, both the central Department and the Maritime and Coastguard Agency, who planned to migrate to the Shared Service Centre in 2008, had detailed training plans in place with the aim of making users fully aware of the implications of moving to a shared services environment. At the equivalent stage before the Driver and Vehicle Licensing Agency and the Driving Standards Agency migrated in April 2007 neither the Shared Service Centre nor the agencies had been able to prepare adequate training or materials because changes and corrections were still being made after some training had already been delivered. The Senior Responsible Owner for the Programme has also identified a need to engage more closely with stakeholders including the Chief Executives of the agencies moving onto shared services to ensure that the required business changes are taking place, and to promote the benefits of shared services. The Shared Service Centre Business Plan 2008-2011 clearly indicates that management see focused customer engagement – both at a business level and at the level of individual users – as critical to the success of the Shared Service Centre and they have put in place processes to deliver this engagement, such as single points of contact on the customer service desks.

<Internals\1. Case\ICT 11 Ministry of Defence The Defence Information Infrastructure> - § 2 references coded [0.39% Coverage]

Reference 1 - 0.49% Coverage

Benefits at risk. Ultimately, continued underperformance will make it harder for the DII Programme to enable the Department's other change programmes, and may mean that funding has to be diverted to pay for additional terminals to run on legacy systems as an interim measure. See Box 4 for an example. Similarly, the direct benefits of more efficient ways of working, more functionally rich information

technology and better communication are largely being postponed at present. Of the Department's main parts only the Defence Equipment and Support organisation has a majority of its computer users working on DII. When the time comes to realise these benefits, the Department may need to invest additional resources to train its staff in how to exploit fully the new system they are using. The Department will continue to embark on new change initiatives and the DII Programme will be required to adapt; it will need to do this without causing further delays to the rollout of DII terminals.

Reference 2 - 0.30% Coverage

DII users have been concerned by time taken by ATLAS to resolve change requests. The problems occurred in part because the Department had appointed an insufficient number of trained staff to approve changes before passing them to ATLAS, a problem which has now been resolved. For its part, ATLAS has been managing change requests through inefficient, manual processes, because of the lack of software functionality, including the lack of a proper service catalogue. ATLAS hired additional staff and simplified the manual process, before a new tool was introduced in April 2008 to resolve the problem.

<Internals\1. Case\ICT 12 Department for Work and Pensions Information Technology Programmes> - § 1 reference coded [0.41% Coverage]

Reference 1 - 0.81% Coverage

Emphasis on learning and development: The project has involved the training of around 10,000 staff to operate the new arrangements and IT. A further 5,000 staff will be trained in the next year. The training was scheduled so that it could be as close to programme launch as possible to prevent learning decay but also to fit in with business pressures such as peak times of work or holiday periods. Much of the training was carried out face to face by experienced in house staff rather than, for example, by e-learning, as this was preferred by many staff and was considered by the team to be more effective.

<Internals\1. Case\ICT 28 Improving the delivery of animal health and welfare services through the Business Reform Programme> - § 1 reference coded [0.16% Coverage]

Reference 1 - 0.32% Coverage

While the Agency has been reducing its reliance on interim staff (Figure 12 overleaf), it recognises there are capability gaps in its current workforce. It is introducing learning and development activities to strengthen staff skills, specifically in programme and project management, and commercial management.

Node IS-2-4: Testing (Incl. Pilot, Proof of Solution)

<Internals\1. Case\ICT_02 Department of Health The National Programme for IT in the NHS> - § 1 reference coded [0.12% Coverage]

Reference 1 - 0.24% Coverage

NHS Connecting for Health required the final bidders to undertake “Proof of Solution” tests in a simulated environment with end users, to show whether their systems could meet a number of scenarios devised by NHS Connecting for Health. NHS Connecting for Health also undertook due diligence on the winning bidders to establish their ability and capacity to deliver the contracts they were to be awarded.

<Internals\1. Case\ICT_04 The delays in administering the 2005 Single Payment Scheme in England> - § 4 references coded [0.77% Coverage]

Reference 1 - 0.36% Coverage

The decision to accept IT components before full testing had been satisfactorily completed may have appeared a pragmatic approach to enable payments to commence on time. However, once introduced into the live processing environment, some of the systems encountered problems that delayed the processing of claims. The Agency did not have the time to test the system as a whole before introduction. Each key element of the system was tested before introduction, but problems arose afterwards as the testing could not fully simulate the live environment.

Reference 2 - 0.79% Coverage

Piloting can be an effective method of identifying problems that might arise during implementation.²⁵ In this case, however, the Agency did not adequately pilot the land registration and underestimated the number of fields and other parcels of land that farmers would register. This underestimate arose partly because the switch to the single payment scheme enabled more farmers, such as horticulturists and those with small numbers of livestock, to claim (the number of farmers increased from 70,000 in 2004 to 116,000 in 2005), and partly because the Agency had not anticipated how many additional small areas farmers would include.²⁶ The Agency had estimated that the Register would comprise 1.7 million records (each field of land must be registered), whereas in practice there are 2.1 million records. In three quarters of the 363 cases we examined, farmers had registered extra land. According to progress reports from the Agency, around 1,200 maps were being received each week, compared to an expected 200 a week. Accenture noted that the requirement to register all land in the first year of the single payment scheme required over 100,000 land changes to be processed, compared to an estimated 9,000 changes a year from there on.

Reference 3 - 0.40% Coverage

In its January 2005 Gateway review, the Office of Government Commerce expressed concerns that there remained significant weaknesses in Accenture's management of their testing team and the Agency issued a letter alleging breach of contract in February 2006 over concerns about the level of systems downtime. Accenture refuted the contents of the letter and in the same month, the Office of Government Commerce concluded that relations had improved and that Accenture was performing to a stronger standard. Their report noted that the stability of the technology had improved and the testing regime was now more rigorous.

<Internals\\1. Case\\ICT 05 2 Delivering successful IT-enabled business change Case Studies> - § 6 references coded [0.47% Coverage]

Reference 1 - 0.08% Coverage

Thorough technology trialling enabled Transport for London to prove the automatic number plate recognition technology was "fit-for-purpose", before it committed significant investment.

Reference 2 - 0.24% Coverage

After researching a number of different technologies and examining road pricing schemes in other parts of the world, Transport for London selected Automatic Number Plate Recognition as the Scheme's technology platform for enforcement. One of the key advantages was its maturity, having been in use since the early 1990s in such places as London's "Ring-of-Steel", a surveillance cordon surrounding the City of London installed to combat terrorist threats. To further prove the suitability of this technology and reduce risk, trials were carried out with a number of different suppliers.

Reference 3 - 0.16% Coverage

Transport for London also decided to require the two organisations shortlisted to build and operate the core IT systems to conduct a technical design study. Two main benefits came from these exercises; firstly, the data helped Transport for London refine its technical specifications and, secondly they helped to reduce operational risk and get better value out of the competitive process.

Reference 4 - 0.08% Coverage

A six month "Proof of Concept" exercise allowed the Causeway team to properly gauge the performance of all short listed suppliers, prior to contract signing and the

commitment of large sums of money.

Reference 5 - 0.30% Coverage

The key challenge for the Causeway team was to establish whether it was technically possible to pass a great deal of information between six different case management systems. To address this risk the team conducted a proof of concept exercise with three short-listed suppliers. This lasted six months and involved the provision of approximately £250,000 funding to each potential supplier as an innovative incentive for each to develop a prototype system to test its ability to deliver a working solution. Each supplier was given equal access to the constituent Criminal Justice Organisations and their respective documentation – with “Chinese Walls” in place to ensure each team’s activities were kept separate from competitors.

Reference 6 - 0.09% Coverage

Testing a paper-based version of the proposed business process with front-line staff proved that the system would work, identified potential improvements and secured staff support for the proposed business change.

<Internals\1. Case\ICT 10 Shared services in the Department for Transport and its agencies> - § 4 references coded [0.63% Coverage]

Reference 1 - 0.04% Coverage

Decisions to save money on system testing proved to be a false economy

Reference 2 - 0.29% Coverage

To limit cost increases, in November 2006 the Programme Board removed some technical elements of the Programme, including the full pre-production environment. In March 2007 the implementation team identified this as the most critical element removed from the Programme because it meant that when the first two agencies began using shared services in April 2007, all further system upgrades and remedial testing were conducted on the live system.

Reference 3 - 0.41% Coverage

Lack of this facility therefore slowed upgrade testing and also perpetuated difficulties with the speed and instability of the system, resulting in system crashes as some software changes failed when loaded onto the live system. These difficulties have damaged the credibility of the system with the initial users of shared services. In September 2007 the Department recognised the significance of these problems and allocated £2.1 million to reinstate the pre-production environment into the

Programme to support full system testing before the migration of the next two businesses. Early indications are that this facility has smoothed the migration of the central Department in April 2008.

Reference 4 - 0.51% Coverage

There was inadequate implementation and testing of the SAP Enterprise Resource Planning system before April 2007. The Programme team was not able to implement the SAP Enterprise Resource Planning system in accordance with best practice in the latter stages principally because of a lack of time. This blurred the delivery phases of the Programme. As a consequence of the drive to meet the timetable, users had insufficient time to test the software, and only a bare minimum of performance testing of the whole system was therefore possible.¹⁰ For example, SAP recommends that organisations undertake technical robustness checks approximately two months before go-live to confirm system stability. For shared services the Programme team undertook them two weeks before go-live on a system that was continuing to evolve.

<Internals\\1. Case\\ICT 12 Department for Work and Pensions Information Technology Programmes> - § 2 references coded [0.84% Coverage]

Reference 1 - 1.24% Coverage

Productivity Release 1 was released in September 2008, once the Agency was satisfied that the go-live criteria had been met. The Agency's early thinking was that the IT could possibly be in place by July 2007, which was later revised to March 2008 once it had established the complexity of what was required, so it was some six months later than expected. The Agency, taking into account the complexity of Productivity Release 1, adopted a significantly extended, multi-stage testing approach than had been originally planned for. This included five 'dress rehearsals' to practice the activities and processes using the system. Testing also included a three week period of 'live like testing' using live data, where users progressed cases on the test system as if it were 'live' to identify issues and supporting processes. This enhanced testing approach provided additional assurance that the planned upgrade was fit for purpose.

Reference 2 - 0.44% Coverage

The completed proof of concept work provided the Department with assurance that the system was able to deal with the volume of benefit payments it needed to process. The system was tested with 30 million payments in an overnight run, a far greater number than those with which the Department expects the system to have to deal.

<Internals\\1. Case\\ICT 24 The BBC's management of its Digital Media Initiative>
- § 3 references coded [1.05% Coverage]

Reference 1 - 0.60% Coverage

Thorough testing is central to software development. Without a structured approach to testing and the capability and capacity to plan and carry out such testing the Programme team risks delivering partially tested components with a high expected rate of failure. This would add the additional expense of fixing faults at a late stage in the process with serious damage to user confidence. The BBC has well documented processes for integration testing and user acceptance testing and has carried out such testing successfully on the technology released so far.

Reference 2 - 1.15% Coverage

The main risks that the current approach to testing has are that: there is no documented Testing Strategy defining the test policy to be followed, although this is a priority for the recently-appointed Test Manager. Having such a strategy helps define the approach to testing and makes it easier to enforce a test discipline Programme-wide. This is particularly important in the iterative development process that the BBC has adopted, where testing has to be carried out regularly and repetitively through each iteration. Inadequate or incomplete testing could lead to further delays; and while manual testing has been adequate for the early releases, it will become progressively more difficult and time consuming as the Programme continues and inter-dependency between component parts of the system increases. Insufficient use has been made so far of the automated test tools that are available. Such test tools formalise the test process and automate difficult areas such as repetitive regression testing, which can then be completed as a matter of course.

<Internals\1. Case\ICT 28 Improving the delivery of animal health and welfare services through the Business Reform Programme> - § 1 reference coded [0.47% Coverage]

Reference 1 - 0.93% Coverage

IBM and the Agency identified inadequate testing contributed to a significant part of the problems with release six. A representative sample of real data was not used and testing not undertaken over a realistic period of time. IBM was responsible for the system testing and the Agency for the user acceptance testing. Furthermore, there were issues with data migration routines on go live, which were also IBM's responsibility. The Agency's Chief Executive has stated that the problems with the release should not have happened and that resolving them was a priority. Fortunately, the Agency had negotiated a fixed-price contract for release six which transferred risk to IBM. The significant cost of fixing defects has therefore fallen to IBM. The Agency and IBM have learned lessons and have improved testing and preparation for future releases. The Agency intends to negotiate fixed-price contracts for the releases.

Node PS-2-2: Policy Change

<Internals\1. Case\ICT 04 The delays in administering the 2005 Single Payment Scheme in England> - § 3 references coded [0.67% Coverage]

Reference 1 - 0.57% Coverage

In its November 2003 business case, the Agency set milestones for the delivery of the core IT infrastructure by December 2004. The work on developing the IT systems during 2004, however, included a number of assumptions about what the final policy on the single payment scheme would involve and on the detail of the final regulations from the European Commission. The former Chief Executive confirmed that he had highlighted the risks in finalising detailed scheme requirements. By December 2004, the Agency had identified 23 changes to be made to the computer systems, largely as a result of subsequent revisions to EU Regulations and legal clarification of those Regulations, and partly from Ministerial decisions and other changes identified.²⁰ These changes also led the Agency to revise its forecast of the number of farmers who would be eligible for funding from 90,000 to 120,000.

Reference 2 - 0.24% Coverage

Failure to implement the new regulations would have exposed the United Kingdom to greater risk of disallowance by the European Commission. In accordance with EU Regulations the Department had already notified the Commission by 1 August 2004 of the United Kingdom's decisions on implementation of the single payment scheme and did not consider that deferral to 2006 was an option.

Reference 3 - 0.53% Coverage

However, incorporating the change requests led the Agency to revise their implementation timetable so that the key IT systems would be ready by September 2005 (see Figure 3) and to defer some parts of the original system design. For example, it had designed application forms suitable for machine reading, but scoped this out and substituted manual data entry (Release 3a0) instead.²¹ At the same time the Agency revised its probability of success from 90 per cent to 70 per cent and deferred the forecast date for making the first payments from December 2005 to February 2006. Although the Agency and its contractor (Accenture) kept to this new timetable, our analysis of events indicates that the pressure to meet deadlines led the Agency to proceed without sufficient evidence of the robustness of the overall business systems.

<Internals\1. Case\ICT 08 The Procurement of the National Roads Telecommunications Services> - § 2 references coded [0.49% Coverage]

Reference 1 - 0.97% Coverage

There were a number of policy, operational and other changes during the procurement of the NRTS contract that led to delays: a) In July 2000, the Department for Transport published “Transport 2010: The 10 Year Plan”. The published plan meant that the procurement team had to take account of plans for roadside communications at a time when the Agency had no firm strategies in place to meet its new objectives; b) The decision in March 2001 to expand the scope of the project to include: upgrading the telecommunications technology from analogue to digital systems; and maintenance of telecommunication links between the trunk cable network and 14,000 roadside devices; c) Between 2001 and 2004, the procurement team had to respond to challenges from within the Agency about the suitability of the proposed PPP for the NRTS; d) Changes to the telecommunications systems to accommodate a Ministerial decision to bring forward the replacement of 32 police control offices with seven regional control centres and the introduction of the Traffic Officer service; e) Changes to the proposed specification and other documents to reflect the results of the 2003-2004 affordability review; f) In spring 2005, a two-month long intervention in the negotiations by GeneSYS’s debt providers.

<Internals\1. Case\ICT 09 1 The National Programme for IT in the NHS Progress since 2006> - § 2 references coded [0.38% Coverage]

Reference 1 - 0.76% Coverage

Just as the Programme touches on practically every aspect of the NHS, from time to time the NHS has major effects on the Programme. Policy and operational changes in particular can add requirements that are difficult and potentially costly to meet, as the following examples show: 1) The 2004 NHS Improvement Plan set out the aim that by 2008 no one will wait longer than 18 weeks from GP referral to hospital treatment. Many systems, including those provided under the Programme, required adjustment (a ‘solution’) to track performance against the 18-week limit. NHS Connecting for Health estimates that 111 care records systems had received a solution at 31 March 2008, leaving 60 to provide the required data through workaround solutions; 2) Compliance with the Mental Health Act 2007 requires good knowledge of the complex requirements. Ideally mental health systems provided under the Programme should support mental health administrators, for example by recording details of Sections in line with the Act, and allowing input and reporting on appeals, renewals, regrades and tribunals, including dates, times, attendees and meeting outcomes; 3) The Department makes periodic changes to the organisational structure of the NHS, for example in July 2006 the number of Strategic Health Authorities was reduced from 28 to 10 and of Primary Care Trusts from 303 to 152. Such reconfigurations lead to changes in information requirements and the Programme needs to have the facility to reconfigure information so that it reflects new organisational boundaries.